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Vol. 201. 85th Year. | LONDON, FEBRUARY 8, 1933. | No. 3638. Price 1s.

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See p. 327 for this week's announcement.
Previous Announcement February 1.

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COWAN'S METERS
See Advertisement on page III. of Wrapper.

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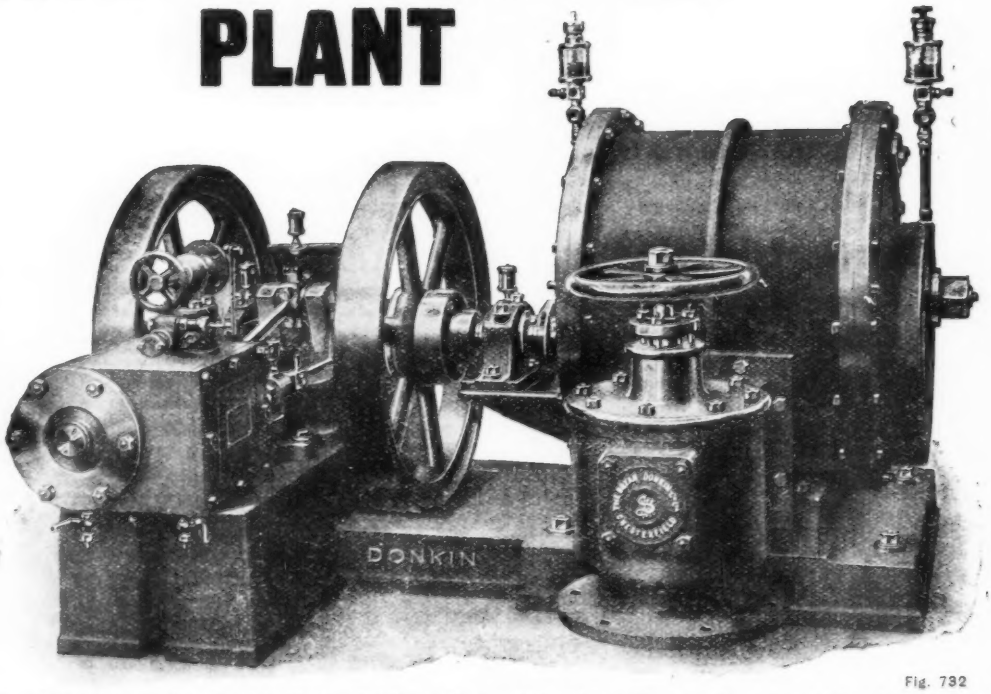

Fig. 732

Gas Exhauster coupled direct to Horizontal Steam Engine (C type), combined on the same cast iron base plate.

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SILICA RETORTS.

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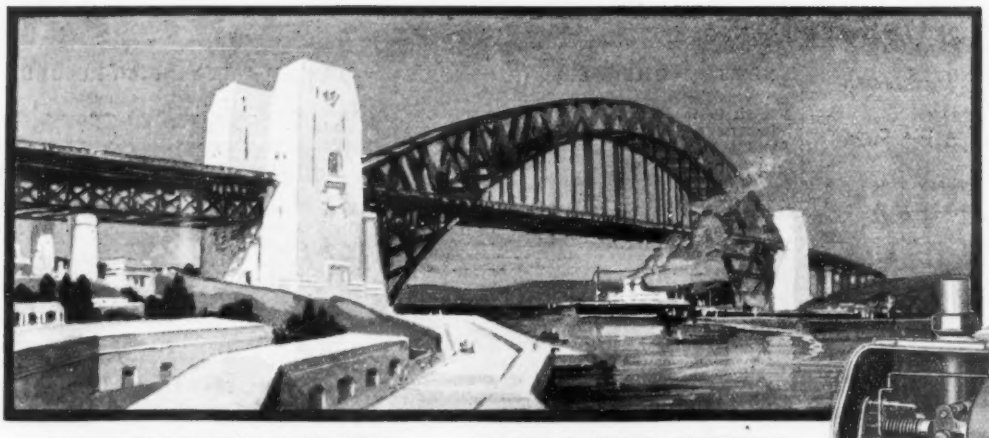

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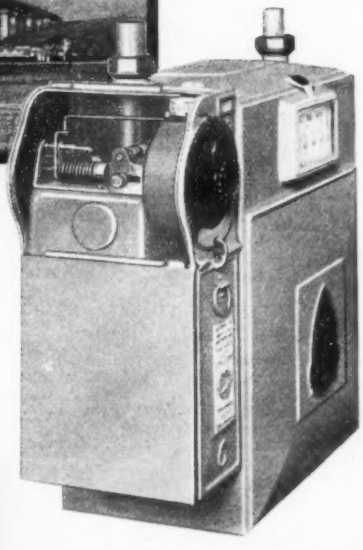

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THE GAS JOURNAL

FEBRUARY 8, 1933

Vol. 201. 85th Year No. 3638

A Glance at the Contents—

New Waterless Holder Construction Principle.

The waterless gasholder erected at the Berlin Bernau Gas-Works by the Bamag-Meguin A.G. is described in an extract from "Das Gas- und Wasserfach." [p. 312.]

Croydon's "Home Health Week."

The Croydon Gas Company last week staged a very effective display of clinical gas lamps in their chief showrooms, which attracted considerable interest in the district. [p. 311.]

Mid-Southern Utility Company.

The Annual Meeting of the proprietors of the Mid-Southern Utility Company was held at Farnborough on Thursday, Feb. 2, 1933—Mr. R. W. Edwards, J.P., C.C., presiding. [p. 320.]

Gas in Toronto's Industries.

Some of the many applications of gas in Toronto's industries are referred to in an article extracted from "Gas-atack," a bulletin for the Sales Department of the Consumers' Gas Company of Toronto. [p. 308.]

Gas in Tinplate and Sheet Industries.

The application of gas to the tinplate and sheet industries was dealt with by Mr. A. D. Howells, of Neath, in a paper which he read, on Jan. 28, before the Wales and Monmouthshire Junior Gas Association. [p. 313.]

Engineer and Manager Required.

The Spennymoor and Tudhoe Gas Company advertise for an Engineer and Manager at a salary of £300 per annum. [p. 325.]

Carbonization with 103-in. Verticals.

In a paper before the Manchester and District Junior Gas Association, on Feb. 4, Mr. F. A. Rhead, B.Sc., of Wallasey, made some interesting remarks on the general working of an installation of 103-in. vertical retorts. [p. 316.]

Colonial Gas Association Gold Medal.

The Colonial Gas Association, Ltd., offered, and the Australian Gas Institute accepted, a Gold Medal for the best paper, from the viewpoint of the smaller works, presented at the annual meetings of the Institute. The first award was made at the recent annual convention of the Institute, held in Sydney. [p. 309.]

Petrol from Coal.

"The potential annual output of coal in Britain is estimated to be over 300,000,000 tons, and the actual output in 1931 was 224,000,000 tons. Excess productive capacity is at least 76,000,000 tons, and if 13,000,000 tons were used to produce all petrol requirements it would only represent 17% of our excess productive capacity."—Mr. John Brass, in his Presidential Address to the Institution of Mining Engineers. [p. 310.]

Forthcoming Engagements

Feb. 13.—MIDLAND ASSOCIATION.—Annual Dinner, Grand Hotel, Birmingham. Reception, 6.0 p.m.; Dinner, 6.30 p.m.

Feb. 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1.

Feb. 14.—INSTITUTION OF GAS ENGINEERS.—Meetings of Finance Sub-Committee, 9.30 a.m.; Finance Committee, 10 a.m.; Executive Committee of Council, 10.30 a.m.; Benevolent Fund Committee of Management, 12.15 p.m.; Council, 2.15 p.m.; Education Executive Committee, 4 p.m.; Industrial Gas Committee, 4.15 p.m., 28, Grosvenor Gardens, S.W. 1.

Feb. 14.—FEDERATION OF GAS EMPLOYERS.—Meeting of Central Committee, 28, Grosvenor Gardens, S.W. 1.

Feb. 15.—B.C.G.A.—Meeting of the Executive Committee at 12 noon in the Board Room, 28, Grosvenor Gardens, S.W. 1.

Feb. 16.—S.B.G.I.—Joint Council Meeting at 2.30 p.m.

Feb. 17.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. P. Richbell.

Feb. 18.—YORKSHIRE JUNIOR ASSOCIATION.—Meeting at Bradford. Paper by Dr. F. J. Dent.

Feb. 21.—INSTITUTION OF GAS ENGINEERS.—Meeting of Gas Appliances Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Feb. 21.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

Feb. 23.—JOINT JUNIOR ASSOCIATIONS.—Visit to B.I.F., Birmingham.

Feb. 24.—Official visit of Gas Salesmen's Circles to the British Industries Fair, Birmingham.

Feb. 28.—B.C.G.A.—Meeting of the General Committee at 3.0 p.m. in the Bradford Room, British Industries Fair, Castle Bromwich, Birmingham.

Feb. 28-March 2.—Joint Gas Conference at the B.I.F., Birmingham.

March 4.—SCOTTISH JUNIOR ASSOCIATION (WESTERN DISTRICT).—Meeting at Glasgow. Address by Sir Francis Goodenough.

March 9.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. A. W. Attwood.

March 10.—MANCHESTER DISTRICT ASSOCIATION.—Annual General Meeting, Midland Hotel, Manchester, 2.30 p.m.

March 11.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bath. Four short papers.

March 15.—B.C.G.A.—Meeting of Executive Committee, 12 noon, 28, Grosvenor Gardens, S.W. 1.

April 7.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Spring Meeting in Glasgow.

April 12.—INSTITUTE OF FUEL.—Visit to Beckton Coke Ovens and Greenwich "Metro-Coalite" plants.

April 19.—B.C.G.A.—Meeting of Executive Committee, 12 noon, 28, Grosvenor Gardens, S.W. 1.

May 11-12.—EASTERN COUNTIES ASSOCIATION.—Spring General Meeting at Croydon.

EDITORIAL NOTES

Accounts of the Metropolitan Gas Companies

Gas Light and Coke Company

THE accounts of this vast organization—one of the greatest public utility undertakings in the country—are always interesting reading, and those published for 1932 show that the Company has had a most successful year, thus further consolidating its sound financial reputation. It will be remembered that as from the 1st of January last year the Company took over the Southend-on-Sea and Brentwood Gas Companies, so that the current accounts include a full year's working of these concerns.

The sale of gas amounted to 252,640,417 therms, a decrease of just over 2½% compared with the previous year, which is a remarkable achievement having regard to the depression which has existed during the whole period under review. The price of gas has remained the same at 8⅜d. per therm in the main area of supply, and it is interesting to note that an increase or decrease of one-fifth of a penny per therm on the sales to consumers for last year would affect the receipts by no less a sum than £198,478 (gross).

There has been an expenditure on capital account of £537,649 (against £1,195,803)—viz., on land £33,941, buildings and machinery £11,734, mains and service pipes £195,963, meters £158,808, and stoves £137,203—while an amount of £221,928 has been written off for depreciation of steamships, meters, and stoves; the net capital expenditure, therefore, being £315,721. The total capital expenditure as at the 31st of December last, less nominal additions and amounts redeemed, works out at 1s. 11·36d. per therm sold. The other side of the account shows that the Company has now raised, including premiums, a little over £41,000,000, leaving nearly £3,500,000 of debenture capital to be issued.

An analysis of the revenue account reveals the fact that, despite large variations in some of the individual items, the balance carried to the net revenue account—£2,034,681, against £2,030,842—is almost the same. On the credit side, the receipts from the sale of gas amount to £8,642,663—a reduction of £228,731. Rentals are a trifle down, but the revenue from residuals (£1,886,832) shows a very satisfactory increase of £112,293, which is mainly attributable to the larger receipts from tar and benzole (£141,613). This result is doubtless partly due to the anticipated increase in the output of benzole referred to at the last meeting. Sulphate of ammonia still shows a loss, and receipts from coke were less by reason of the reduction in the net price obtained—19s. 6d., against 20s. 9d. per ton. On the expenditure side, coal and expenses thereon cost more by £17,103, but the amount spent on oil and coke for water gas manufacture shows a reduction of £162,971. Carbonizing wages are nearly £30,000 less, while repairs and maintenance of works and plant cost £1,526,327, against £1,736,241—a substantial saving of £209,914. The Company spent £113,098 more on distribution, which was mainly attributable to the larger amount required for the repair and renewal of stoves. Rates and taxes were up by £65,143, though this is due to the fact that the costs under this head for 1931 had been reduced by an adjustment for income-tax. Expenses in connection with amalgamations, and payments to Southend Stockholders, are extra items amounting to £107,195, while £51,114 expended during 1931 on debenture issue expenses does not recur.

After paying the dividend for the June half year, and contributing £20,000 to the Redemption Fund, there is a total available balance of £913,768 (against £904,547), out of which the Directors have recommended dividends at the full rates for the December half year on the 4% preference stock, the 6% Brentwood redeemable preference stock, and the 3½% maximum stock, while the rate on the ordinary stock has been maintained at £5 12s.% per annum. These payments, together with a further £20,000 contribution to the Redemption Fund, will absorb £698,218, and the carry forward is consequently raised from £205,576 to £215,550.

The following costs per therm sold show that the final results compare very favourably with those of a year ago:

	1932. d.		1931. d.
Expenditure (*less* residuals and expenses of amalgamation and, for 1931, expenses of debenture issue)	7·58	..	7·81
Gas, rentals, &c.	9·62	..	9·77
Balance, being profit	2·04	..	1·96
Dividend and interest	1·90	..	1·87
Surplus	0·14	..	0·09
Contributions to funds and expenses	0·13	..	0·07

South Metropolitan Gas Company

NOTWITHSTANDING a continuance of the widespread industrial depression during the whole of last year, the final results disclosed by the accounts of the South Metropolitan Gas Company for this period show comparatively little change over those of the previous year. It is true that the receipts for gas and residuals are less, but with regard to the former the report states that, despite the depression, it is a cause for satisfaction that these have not fallen to a greater extent than rather more than 4% below those of 1931.

The capital expended during the year on buildings, plant, machinery, and district appliances was £103,727, against £164,568, while the receipts have increased by £850,000, *plus* premiums, in respect of an issue of this amount of 4% preference stock during the year at an average price of £101 6s. 2d.%. This account has now a credit balance of £414,704.

A comparison of the chief items in the revenue account with those of 1931 shows that the receipts for gas have decreased by £151,097, and the income from residuals by £61,851. The revenue from the latter items has fallen in all cases, though the demand has continued good. As foreshadowed in the report for the previous year, the cost of manufacturing sulphate of ammonia has exceeded the revenue derived therefrom. Rentals of meters, stoves, and fires realized more by £8490, but fittings produced £17,741 less, a net reduction of £9251. Against this falling off in receipts, however, there have been very substantial savings in the cost of manufacture. Coal, owing to the reduced quantity carbonized (1,239,282 tons, against 1,301,385 tons), at a slightly lower price per ton, cost less by £71,407. Repairs and maintenance of works and plant showed a saving of no less than £154,039, and carbonizing wages were down by £21,115. These three economies alone, therefore, more than wipe out the reduction in the receipts. Distribution costs, however, were heavier by reason of the larger expenditure on the repair and renewal of meters, and management expenses were also above those of last year.

The result is a reduction in the balance of the revenue account from £599,926 to £562,609, a difference of £37,317. Adding thereto the balance brought forward and interest and dividends received, the total of the net revenue account is £639,244, against £693,776. After allowing for interest on loans and debenture stocks, preference dividends and the interim dividend at 2½% on the ordinary stock to June 30, 1932, there remains a balance of £236,945 available. The Directors have recommended a final dividend of 3½% on the ordinary stock (the same), which will absorb £234,846, leaving a

small surplus on the year's working to be carried forward.

Turning to the working results, some of which are shown below, it will be seen that these have maintained a consistently high level, and the Company is justly proud of the efficient maintenance of its distributing plant:

	1932.		1931.
Cost of coal per ton	19s. 7·43d.	..	19s. 9·36d.
Therms made per ton of coal carbonized	75·13	..	75·19
Gas unaccounted-for p.ct. of make	0·15	..	0·36
Coke made for sale per ton of coal carbonized (cwt.)	9·33	..	9·30
Tar made for sale per ton of coal carbonized (galls.)	10·46	..	9·99
	s. d.		s. d.
Prices realized—			
Coke (per ton)	19 5·02	..	19 9·98
Breeze (per ton)	2 5·97	..	2 8·49
Tar (per gall.)	0 2·27	..	0 2·45

A comparison of the final costs per therm sold indicate how very similar the year's results are with those of 1931:

	1932. d.		1931. d.
Expenditure (*less* residuals and contributions to funds and, for 1932, expenses *re* issue of capital)	7·65	..	7·65
Gas, rentals, &c.	9·17	..	9·15
Balance, being profit	1·52	..	1·50
Dividends and interest	1·48	..	1·45
Surplus	0·04	..	0·05
Contributions to funds, &c.	0 04	..	0·05

Commercial Gas Company

This, the smallest of the three Metropolitan Companies, is in one important aspect very dissimilar to its near neighbours, for it has no possibilities of expansion beyond the present limits of supply, and consequently the state of trade and climatic conditions are reflected in the accounts to a greater degree than is perhaps the case with any other gas undertaking. These conditions showed little, if any, signs of improvement last year, and it is not surprising therefore that the Company has to record a decrease in the output of gas. The loss of revenue occasioned by this fall in consumption (a little over 4%) has, however, been largely met by economies which, by good management, have been effected under nearly all heads of expenditure, as is illustrated below. Moreover, we understand that for the first month of the current year the output has materially improved.

The capital expended has been increased by an amount of £2635, which is chiefly attributable to the cost of new and additional prepayment meters and fittings, the number on the district having increased in the aggregate from 90,928 to 92,709. The other side of the account shows that, as at the date of the closing of the books, £276,325 of ordinary stock was exchanged during the year for £265,272 of 5% irredeemable debenture stock. It will be remembered that in September last the Directors invited applications for the exchange of ordinary stock for the new debenture stock in the proportion of £100 ordinary stock for £96 debenture stock, and the report states that, as provided by the Company's Act of 1932, the above amount of ordinary stock has been cancelled and extinguished. There is still a balance of about £70,000 available for exchange.

The following comparison of the principal items of expenditure in the revenue account with those of the previous year shows the extent of the economies referred to above:

	Year 1932. £		Year 1931. £		Increase or Decrease. £
Coal and oil cost	268,578	..	288,942	..	—
Residuals realized	191,428	..	208,323	..	—
Net coal and oil	74,150	..	80,619	..	− 6,469
Wages carbonizing	35,767	..	36,112	..	− 345
Purification	6,175	..	5,658	..	+ 517
Wear and tear	90,701	..	111,499	..	−20,798
Distribution	211,033	..	210,473	..	+ 560
Management	52,371	..	53,217	..	− 846
Rent, rates, and taxes*	35,290	..	35,677	..	− 387
Other expenditure	56,269	..	58,995	..	− 2,726
	561,756	..	592,250	..	−30,494

The gross profit shows little variation at £135,475, against £137,195. The dividend at 5¾% (against 5⅞%), interest, and stamp duty requires £139,280, the difference being a deficit on the year of £3805 (against £8643 for 1931).

The working results have maintained the usual high standard. The cost of coal per ton carbonized (253,468 tons) at 21s. 2·31d. shows a reduction of a little over 9d. per ton on last year. Therms made are a trifle down, being 73·27 per ton of coal, against 73·89 in 1931, and coke made is consequently less at 10·94 cwt., as compared with 11·09 cwt. per ton of coal. A particularly interesting result is the low percentage of unaccounted-for gas—viz., 4·12%. This figure has been consistently improving for some years past, and compares with 6.55% in 1930, and 5·39% in 1931. Coke has realized 21s. 11·81d. per ton, against 22s. 4·69d., while tar per gallon is nearly ½d. better at 3·21d.

The following costs of net expenditure and receipts per therm sold also serve to illustrate the economic working which has been attained during the year under review:

	1932. d.		1931. d.
Expenditure (*less* residuals)	7·81	..	7·89
Gas, rentals, &c.	9·69	..	9·72
Balance being profit	1·88	..	1·83
Dividend and interest	1·93	..	1·94
Deficiency	0·05	..	0·11

High-Capacity Verticals

In our columns to-day is a useful account of the working of a new installation of 103-in. continuous vertical retorts for a period of six months in 1932. The installation, which has a daily capacity of 2½ million c.ft. of 470 B.Th.U. gas, is by the Woodall-Duckham Company, and is at the works of the Wallasey Gas Department; it was brought into operation in July last, and in more ways than one has proved highly successful. The account of its working is by Mr. F. A. Rhead, of Wallasey, who, at the commencement of his contribution, cites the advantages of the large retort, and mentions that by its use the effective gas-making capacity of the ground space occupied has been increased more than fourfold, this comparison being with a horizontal retort bench previously on the site.

Three points in Mr. Rhead's excellent paper are worth emphasizing—the use of breeze in the producer, the care taken in the selection and blending of coals to produce a satisfactory low-ash coke, and a reference to spalling. The grate area of the producers at Wallasey has been increased from the standard in order to gasify breeze, and at the present time 80% of the fuel charged is actual breeze—*i.e.*, portions of the grade from the rotary coke screens passing through a wire mesh of 1 in. square—and includes all dust. On the practice and policy of using breeze, the author has the following comments: "It has been found that when using 80% of fuel below 1 in. there is a considerable reserve in hand for the maintenance of carbonizing temperatures in the retort bench, and that it is more economical to use larger quantities of breeze, as the cost of this, weight for weight, is usually less than half that of unscreened coke. In addition, there is the further financial advantage brought about by an increased amount of higher priced fuel for sale and a steady outlet for a larger proportion of the breeze produced on the rotary screens."

Then, as regards coal selection and blending, there can be no doubt that Wallasey is adopting an enlightened, progressive policy—just as there can be no doubt that collieries have greatly improved their methods of cleaning. Twelve coals have been chosen, and the average ash content has been less than 4% with a maximum of 5% from North Wales, and in many cases an average over the twelve months of 2%. A careful system of blending has been attended with such success that screened coke, domestic nuts, and breeze from the screens have been saleable containing 5% moisture and 7% ash—figures certainly better than those to which one is accustomed, and which reflect high credit on Wallasey. The other matter we have mentioned—spalling—is of interest. We gather that Mr. Rhead is working with combustion flue temperatures in the neigh-

bourhood of 1350° C., with 1370° C. as a maximum; and, he says, " spalling appears to be practically non-existent."

The Population Expert

An article which appeared in " The Times " a short while ago placed before readers evidence of the need in industry of yet another profession—that of the population expert. The subject as presented is of unusual interest, and the prime importance of all that is involved entitle the article to the most careful consideration. The author says, and we are in no position to contradict him, that few things can be so accurately predicted ahead as the trend of human population, and that for practical purposes the reliability of competently constructed population forecasts is ample. Some decline in the population of Great Britain in the near future appears to him to be inevitable, but its incidence is bound to prove uneven.

It is to the effects of this turn of the tide of population that we wish specially to refer here—effects which the writer of the article in " The Times " reminds us must in any case be immense. " If," he says, " some areas are permitted to encourage unplanned growth, such as we have seen in Greater London recently, by attracting population from other parts which are left derelict, the social and economic consequences may well amount to a national catastrophe." A particular instance is cited, and the writer of the article feels the need for a warning, as " there is every reason to anticipate that, unless appropriate measures are quickly taken, many more local authorities, boards of directors, and others will find themselves caught in the same unenviable trap."

The remedy which is suggested by him is, in the first place, the provision of an authoritative statistical centre to which application can be made for technical advice when " looking ahead " schemes are projected; and, secondly, Government co-ordination and support in order that a constructive influence may be exerted in the migration, expansion, or contraction of industry. A subsequent correspondent to " The Times " advocates a national survey, which would provide us with the scientific foundation which is necessary to make regional planning as wide in scope and as effective in application as it should be. Seeing how much is at stake, the matter is hardly likely to be allowed to pass into oblivion.

The Inhibitor Process

Judging by the recent discussion on papers reported in our columns, many of our readers are interested in new methods of benzole refining that avoid the wasteful destruction of hydrocarbons incident to the long-established acid-washing process. We would like, therefore, to draw the attention of our readers to an article, published in the issue of the " Journal of the Society of Chemical Industry " of Feb. 2 on " Modern Methods of Benzole Refining—The Use of Inhibitors for Preventing Gum Formation " by W. H. Hoffert and G. Claxton. In this paper, an account is given of the relative merits of different inhibitors for preventing the gumming of benzoles during storage, and the authors show how advantage may be taken of such substances in refining benzole to meet the N.B.A. Specification. By applying, when necessary, chemical treatment merely for improving the benzole with regard to sulphur, colour, and odour, and obtaining stability on storage by the use of inhibitors, it is claimed that a greater yield can be obtained than when sufficient chemical treatment is given to produce a stable benzole.

PERSONAL

PRESENTATION TO MR. J. W. BUCKLEY.

At the first co-partnership dinner of the Hornsey Gas Company, Mr. A. M. Paddon, M.Inst.C.E., Chairman of Directors, presented Mr. Joseph William Buckley, M.Inst.C.E., with a set of diamond dress studs and links, which was the gift of the co-partners in recognition of his long service with the Company as Engineer and General Manager, a position which he had recently resigned.

Paying a tribute of admiration and respect to Mr. Buckley, the Chairman said that during the 24 years in which he had held that position he had made every department respond to his skill and management. They wished him many years to take his share of the administration of the Company as one of the Directors. [Applause.]

Mr. Buckley, in returning thanks, said the gracious way in which the presentation had been made on behalf of the co-partners was a little overwhelming, because it was only three years ago that he had tangible evidence of their friendship and fellowship in the form of a gold cigarette case, while to his wife was given a delightful little travelling clock.

While he highly prized and appreciated the present now made to him—while material things counted in a man's life—it was friendship and fellowship which counted still more. And he had reason to believe, and was proud of the fact, that during a period of 24 years with the Hornsey Gas Company he had gained their friendship and fellowship. [Hear, hear.]

Whatever success he had attained had been due in large measure to the support he had received from their Chairman, his co-Directors, and the staff and employees, and that success, again, had been due to good team work.

* * *

LEICESTER'S NEW GAS ENGINEER.

Subject to confirmation by the Leicester City Council on Feb. 28, Mr. James Mitchell, M.I.Mech.E., Engineer and Manager of the Nelson Corporation Gas Department, was appointed Engineer and Manager of the City of Leicester Gas Department in succession to Mr. Hubert Pooley, M.Inst.C.E., who retires on superannuation on June 13 next.

Mr. Mitchell's father was the late Mr. Robert Mitchell, who died when he was Engineer and Manager of the Undertaking belonging to the Edinburgh and Leith Gas Commissioners.

Mr. James Mitchell was educated at George Watson's College, and the Royal High School, Edinburgh, while his technical qualifications were obtained at the Heriot-Watt College, Edinburgh. He served his time with Messrs. Brown Bros. & Co., Ltd., Rosebank Ironworks, Edinburgh, and for a time was engaged at the Works of Messrs. J. Milne & Son, Ltd. From there he went to Dundee as assistant to the late Mr. Alexander Yuill, later being appointed Engineer and Manager to the Montrose Gas Light Company, returning five years later as chief assistant to Mr. Yuill at Dundee. He obtained his present position at Nelson in 1919.

Mr. James Mitchell's younger brother, Mr. George P. Mitchell, recently took over the position of Engineer and General Manager to the Worcester New Gas Light Company.

* * *

Mr. A. E. Adams, West of England Representative for Messrs. George Wilson Gas Meters, Ltd., is now making good progress towards recovery after his recent serious operation.

* * *

Mr. W. H. T. Johns, of the Cheltenham and District Gas Company, took up the duties of his appointment as Deputy Engineer and Manager at Burnley on Feb. 1. Mr. Johns, who is the elder son of Mr. W. H. Johns, Engineer and Manager of the Swansea Gas Light Company, received practical workshop training before being articled to Mr. H. D. Madden at Cardiff. Having completed his articles,

he joined his father at Swansea for a short time before proceeding to Cheltenham, where he was second assistant to Mr. L. E. Twycross. Before leaving Cheltenham Mr. Johns was the recipient of presentations made on behalf of his colleagues and on behalf of the sports and social organizations with which he intimately associated himself.

* * *

Mr. CHARLES JOHNSON, a member of the technical staff of the Chief Engineer of the Liverpool Gas Company, is leaving Liverpool to take up an appointment with a London Gas Company. At the annual staff dinner of the Linacre Works of the Liverpool Gas Company, a suitable presentation marked his leaving. Mr. Johnson studied mechanical engineering and technology at the College of Technology, Manchester, where he was awarded the Associateship of that College. Last year he was awarded the First-Class Engineering Diploma of the Institution of Gas Engineers.

* * *

Mr. T. B. ARMITAGE, who for the past eight years has held the position of Distribution Superintendent to the Cheltenham and District Gas Company, has joined the Sales Staff of the Parkinson Stove Company, Ltd., of Birmingham. Mr. Armitage has had a long experience in gas supply practice, having held previous positions with the Aldershot Gas and Water Company (now the Mid-Southern Utility Company), and for some six years with the Swansea Gas Light Company, as Assistant Outdoor Superintendent. He has, moreover, held executive positions as President of the Wales and Monmouthshire Junior Gas Association, 1922-23, and President of the Western Junior Gas Association, 1928-29. He is an Associate Member of the Institution of Gas Engineers, and a member of the Engineering Advisory Committee of the Cheltenham Technical College, where he is lecturer in gas supply subjects. Mr. Armitage will augment the Company's representation in the West of England.

Correspondence

Solid Smokeless Fuel.

SIR,—The paper by Mr. J. W. Napier in this week's issue of the "JOURNAL" on the above subject is most opportune. I have not yet read the paper but I can and do heartily endorse the last paragraph—The Gas Industry should look into the matter NOW.

Nuneaton, I believe, is still the only gas undertaking that has had any experience in the production of town gas and smokeless fuel in the plant referred to by Mr. Napier.

Yours, &c.,
GEORGE HELPS.

Nuneaton Gas Company,
Feb. 2, 1933.

Opening of the Garston Holder.

SIR,—I was interested to see in this week's issue of the "JOURNAL" a reproduction of a view of the Garston Holder of the Liverpool Gas Company, as it is from one of many I took of both tank and holder during erection, now forty-one years ago. From my records I find that I took two views of the opening ceremony, of which the one reproduced is the better.

The tank for this holder was unique, inasmuch that it was built in somewhat friable red sandstone and consisted of an annular brickwork casing containing a continuous waterproof inner lining of bitumen. I believe the tank has always proved perfectly watertight.

Yours, &c.,
A. M'I. CLELAND
(Late Distribution Superintendent,
Belfast Corporation Gas-Works).

Green Road, Knock, Belfast,
Feb. 4, 1933.

THE NEWS OF THE WEEK

The Financial Results given on p. 269 of our issue for Feb. 1, under the heading "Perth," referred to the Gas Department of the City of Perth, Western Australia.

A Bird's Nest caught in a ventilator is believed to have led to the death of Alfred Davis, aged 15, of Slough, who was found dead in the bathroom at his home. The gas was turned on to heat the water and it is thought that there was no outlet for the fumes. Death was due to asphyxiation.

Manchester District Association of Gas Engineers.—The 63rd Annual General Meeting of the Association will be held at the Midland Hotel, Manchester, on Friday, March 10, Luncheon at 1 p.m., Meeting, 2.30 p.m. Presidential Address by Mr. Geo. Dixon, B.Eng., Assoc.-M.Inst.C.E., of Nottingham.

Mr. H. B. Holliday, the Engineer and Manager of the Wallasey Gas and Water Department, mentioned in an address he gave to the Wallasey Rotary Club that during the past twelve months 58,000 tons of coal had been treated at the Wallasey Gas-Works. Wallasey had 24,219 gas consumers who each used an average of 34,000 c.ft. of gas per annum for 23,812 cookers, 14,475 gas fires, 31,000 gas washboilers, and other appliances.

A New Demonstration Room at the Gas-Works at Bangor, Co. Down, has been formally opened by the Mayor (Ald. W. J. Bradley). Councillor John Neill, who presided, referred to the active forward policy pursued by the Bangor Council in regard to their Gas Undertaking. He said the price charged was the second lowest in Ireland, and was actually less than the pre-war figure. The Mayor mentioned that the new room had been erected by the Department's own workmen. A cookery demonstration was subsequently given by Miss D. J. Baker, a London lecturer. New gas showrooms will shortly be opened in the town.

Final Dividends for 1932.—The Directors of the East Surrey Gas Company have decided to recommend dividends for the half-year ended Dec. 31, 1932, at the following rates per annum respectively: 6% on the Cumulative Preference; 5½% on the Preference "A" Stock; and 6% on the "B" Ordinary Stock, all less income-tax.

Among the British Papers to be presented at the Sectional Meeting of the World Power Conference in Stockholm, June 28-July 4, are "Long-Distance Gas Transmission," by Dr. E. W. Smith, and "The British Coal Survey," by Dr. F. S. Sinnatt and Mr. H. E. Mitton, the authoritative body in each case being the Joint Fuel Committee.

The Fifth Annual Whist Drive and Dance of South Shields Gas Company's staff, held at the Hedworth Assembly Rooms, was attended by 300 members of the staff and guests. The whist prizes were presented by Mrs. Yule, wife of Mr. David Yule, Distribution Superintendent. Mr. G. Robison presented Mrs. Yule with a casket of chocolates. Mr. R. F. Harbottle acted as M.C. for both whist and dance, and also carried out the secretarial duties, assisted by Messrs. G. Robison, R. Aynsley, P. Murray, and E. Franks.

A Reduction in the Price of Gas is Recommended by the Manchester Corporation Gas Committee, for low-pressure lighting purposes, by 1½d. per 1000 c.ft., making the price 2s. 2½d. per 1000 c.ft. in respect of the equivalent quantity of gas consumed during the year 1932-33 (569,000,000 c.ft.), which consumption has been taken as a datum figure for this purpose. All gas consumed in excess of the datum figure will be charged at 2s. per 1000 c.ft. (5·33d. per therm). The Committee also recommend that the reduction of 1½d. per 1000 c.ft. should also apply to gas consumed by public street lamps without the City. The estimated annual value of the reductions is £3850.

THE NEWS—continued.

Gas at the 1933 Chicago Exhibition.—The American Gas Association are taking steps to see that the Gas Industry shall be worthily represented at the Century of Progress International Exhibition which is to open in Chicago on June 1 next. A large space has been secured in the Home and Industrial Arts Building on which a special exhibit will be made to demonstrate the progress of the natural and manufactured Gas Industry in the United States during the past 100 years, the general theme to be followed being that of "Gas—The Ideal Fuel for Home and Factory." The American Gas Association are also arranging to hold their annual conference in Chicago in September next.

Gas Secures Lighting Contract.—At a recent meeting of the Enfield U.D.C. Lighting Committee, the Surveyor submitted estimates from the Tottenham and District Gas Company and the North Metropolitan Electric Power Supply Company for lighting High Street, Ponders End, and reported that, comparing the two estimates, the capital cost for gas would be £235, with an annual cost of £260, from which the present cost of £170 should be deducted, leaving a net cost of £90 per annum. The annual cost, including capital outlay and maintenance, of electricity would be £445, from which the present cost of gas lamps—viz., £170 per annum—should be deducted, leaving a net annual cost of £275. The Committee recommended the acceptance of the tender of the Tottenham and District Gas Company.

British Industries Fair.

Gas Industries Section.

FEB. 20 (MONDAY) . .	Official Opening. Visit of H.R.H. The Duke of York.
FEB. 22 (WEDNESDAY). .	Visit of Editors of Technical Journals to Gas Industries Section in afternoon.
FEB. 23 (THURSDAY) . .	Joint Junior Gas Associations' Day.
FEB. 24 (FRIDAY) . . .	British Gas Salesmen's Day.
FEB. 28 (TUESDAY) . .	Morning: Joint Gas Conference—Welcome by the Lord Mayor of Birmingham and by the President, Birmingham Chamber of Commerce, Mr. Peter F. Bennett, O.B.E. Address by Dr. G. C. Clayton, M.P., C.B.E., J.P. Afternoon: B.C.G.A. General Committee Meeting.
MARCH 1 (WEDNESDAY) .	Morning: Joint Gas Conference—Address by Lieut.-Col. W. M. Carr, M.C. Afternoon: Visit of Women Journalists to Gas Industries Section.
MARCH 2 (THURSDAY) . .	Joint Gas Conference—Address on "Gas for Water Heating."

Dissatisfaction with Electricity for Heating at Smethwick.

At a meeting of the Smethwick Town Council on Feb. 1, several members raised the question of the heating of the Firs Clinic by electricity, and Mr. H. Trinder said they were assured when the contract was entered into that the heating would be adequate and that the cost would be reasonable. They found, however, that the cost was unreasonable and the heating was insufficient.

Mr. W. Salmon said he understood that the cost of current for heating alone, apart from lighting, was £2 8s. a day.

Alderman Morris, in reply, said all the assurances had practically failed, and, unfortunately, they could do nothing until the contract expired in March next. A report would be presented to the Council, but they could not break the contract until then.

Gas Service at Wallasey.

A special feature of the "Wallasey and Wirral Chronicle" for Jan. 28 was an Annual Business Review of Wallasey, and among the business concerns reviewed was the Wallasey Gas Department.

The Gorsey Lane Gas-Works, it was stated, is one of the most up-to-date in the country. Last year a large scheme of re-construction and extension, at a cost of £50,000, was completed. The price of gas to the homes for efficient and economical service for lighting, cooking, heating, and hot water, is the cheapest on Merseyside and includes a free inspection and maintenance service of all gas appliances in the homes by trained and skilled inspectors.

Four excellent gas showrooms are open daily, at which the latest types of gas apparatus for all purposes can be seen, selected, and purchased on easy hire purchase terms over a period of years. Gas exhibitions and cookery demonstrations are held annually at which special explanations are given of the advantages of modern gas appliances.

During the last two years a new service has been arranged—solid smokeless fuel, a special form of screened and graded gas coke nuts, which is proving extremely popular.

Institution of Gas Engineers.

Members of the Institution of Gas Engineers are invited to attend a meeting of the Illuminating Engineering Society at the Institution of Mechanical Engineers, Storey's Gate, London, S.W. 1, at 7 p.m., on Tuesday, Feb. 14, when a paper on "Everyday Photometry by Photo-Electric Cells" will be read by J. W. T. Walsh, M.A., D.Sc., M.I.E.E., and discussed.

Light refreshments will be provided at 6.30 p.m.

Tickets of admission may be obtained from the Secretary, Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1.

Share Sale at Dawlish.

Local gas shares soared to a high price at a sale in the Grand Hotel on Feb. 2, when 560 ordinary shares of the Dawlish Gas and Coke Company, Ltd., were publicly offered for auction.

Unusual interest was shown by the crowded attendance, many being unable to get into the auction room. Public confidence in the Company was displayed by the high price paid for the shares, which was *plus* an auction fee of 6d. per share and the cost of transfer and registration. Also the vendor took the dividend for 1932. The Company has paid 10% for many years.

Offered in blocks of 50, with the bidder having the option of taking up 100, the first lot of 100 was knocked down at 40s. 6d. per share, bidding being very brisk. The same buyer bought the next 100 for 40s. 6d. and the third batch for 40s.

The next three blocks went higher still, and the two 100's were knocked down at 41s. and the last 60 at 41s. 6d.

A Visit to the General Electric Research Laboratories.

Members of the London and Southern District Junior Gas Association took part in a visit of considerable interest on the afternoon of Saturday, Feb. 4, when they inspected the Research Laboratories of the General Electric Company, Ltd., at Wembley.

These laboratories have now been in existence for nearly ten years, and their chief function is the carrying out of study of fundamental scientific principles underlying manufacturing operations, in order that the latter may be accomplished along the most efficient lines. Time being limited, only certain sections were inspected by the visitors, these including the photometric, illumination, and design laboratories; domestic and electrical appliances laboratories; hot and cold cathode laboratories; and the life test laboratory. Special attention is paid to statistics relating to examination and certification of the finished standard lamps.

During the inspection, the Association were entertained at tea in the staff dining-room, at the kind invitation of the General Electric Company, where they were welcomed by Mr. R. P. Dudding, representing Mr. C. C. Paterson, Director of the Research Station, who was unable to be present.

Mr. A. Tennant (President) proposed a hearty vote of thanks to the Company, coupling with this the names of Mr. Paterson, Mr. Dudding, and those members of the staff who had so generously given up their leisure to act as guides. The vote was seconded by Mr. H. C. Sims (South Metropolitan Gas Company), the Senior Vice-President, who remarked that it was very gratifying to see so large a number of members—there were about 100 present—attending the visit. He was sure every one of them appreciated the courtesy of the Company and their staff in making the visit possible and also so interesting.

Mr. R. P. Dudding, in reply, remarked that it was a pleasure to entertain scientifically-minded people, and it had been a great pleasure to himself and his colleagues to explain things and to answer so many direct questions. He regretted the absence of Mr. Paterson, and on his behalf he extended a most hearty welcome. His one regret was that, of a necessity, the visit was limited, with the result that only certain laboratories and workshops could be inspected.

Gas Light and Coke Company.

Report of Directors for 1932.

The Accounts for the year show that, after paying in respect of the June half-year dividends at the rate of:

£	s.	d.				
4	0	0%	per annum on the	4	%	Preference Stock;
6	0	0%	,,	,,	,,	6 % Brentwood Redeemable Preference Stock;
3	10	0%	,,	,,	,,	3½% Maximum Stock; and
5	12	0%	,,	,,	,,	Ordinary Stock;

and, after contributing the sum of £20,000 to the Redemption Fund, and the sum due to the co-partners for the year by the provisions of the Company's Act, 1931, there is a total available balance of £913,767 16s. 9d., out of which the Directors recommend the payment of the following dividends in respect of the December half-year—viz.:

On the 4% Preference Stock at the rate of £4% per annum;
On the 6% Brentwood Redeemable Preference Stock at the rate of £6% per annum;
On the 3½% Maximum Stock at the rate of £3 10s.% per annum;
On the Ordinary Stock at the rate of £5 12s.% per annum;

which, together with the further sum of £20,000 to be contributed to the Redemption Fund, will absorb £698,217 12s. 1d. and leave £215,550 4s. 8d. to be carried forward to the credit of the current year.

The Bill in Parliament, providing for the extension of the Company's limits of supply to Canvey Island, empowering the Company to execute certain works and to acquire certain lands, conferring various powers upon the Company and for other purposes, passed through all its stages and received the Royal Assent on July 12, 1932.

A Bill in Parliament has been deposited to prohibit housing authorities in the Company's area of supply from imposing restrictions as to the form of heat, light, &c., to be supplied or used, and for other purposes. The clauses of the Bill will be explained to the proprietors when, in compliance with Standing Orders, it is submitted for their approval at an Extraordinary General Meeting which will be held immediately after the close of the Ordinary General Meeting.

DAVID MILNE-WATSON,
Governor.

South Metropolitan Gas Company.

Report of the Directors for 1932.

It is a cause for satisfaction that, notwithstanding the widespread industrial depression, receipts for gas have not fallen to a greater extent than rather more than 4% below those of the previous year.

Manufacturing and distributing plant generally has been maintained in a good and efficient condition. The Metro-Coalite Works have been working at full capacity, but there is still much to be done to raise their standard of efficiency to that of the usual gas-works practice. The sales of the product have been satisfactory.

Bye-products continue in good demand, but the revenue from them has fallen in all cases.

The effectiveness of the Company's system of high power street lighting is indicated by the fact that considerable extensions have been made during the past year. There are now twenty-one miles of main roads served by this method.

Advantage was taken of the low money rates ruling in the latter half of the year to raise £850,000 capital necessitated in part by the redemption of 6½% redeemable debenture stock in 1931. The new 4% preference stock realized £101 6s. 2d. per £100 stock.

Proprietors will be asked to approve the promotion of a Bill in Parliament having for its main purpose the amendment of enactments relating to any future issue of capital by the Company.

After providing for interest upon loan capital and the prescribed dividends on the preference stocks, the profit for the year enables a dividend to be paid on the ordinary stock at the rate of 6% per annum less the interim dividend of 2½%.

The present is the forty-fourth year of the Company's Co-Partnership, which continues its uninterrupted course of harmonizing the interests of Capital and Labour.

CHARLES CARPENTER,
President.

THE NEWS—continued.

Commercial Gas Company.

Report of the Directors for the Year Ended Dec. 31, 1932.

The Revenue Account shows a profit for the year of £135,474 13s. 10d., which, together with the balance of £40,194 7s. 11d. brought forward from the previous year, makes a total of £175,669 1s. 9d. After providing for the payment of the interim dividend of £2 10s.%, less income-tax, paid on the ordinary stock in August last, for debenture and other interest and for Stamp Duty, there remains a balance of £94,790 0s. 1d., out of which the Directors recommend the payment of a final dividend of £3 5s.%, less income-tax, making a total for the year of £5 15s.%.

The Bill authorized by the proprietors at the extraordinary general meeting in February of last year received the Royal Assent in July last.

On Sept. 8 the Directors, in accordance with the resolution of the proprietors passed at the special general meeting held on that day, invited applications for the exchange of ordinary stock for 5% debenture stock (irredeemable) in the proportion of £100 ordinary stock for £96 debenture stock. Up to the date of the closing of the books, £276,325 ordinary stock had been exchanged for £265,272 debenture stock, and as provided by the Company's Act of 1932 such ordinary stock has been cancelled and extinguished, and the Capital Account of the Company amended accordingly.

A Bill in Parliament has been deposited "To prohibit the making by housing authorities of conditions as to the form of light heat power or energy to be supplied or used in certain cases in the limits of supply of the Commercial Gas Company and for other purposes." The Bill will be submitted for the approval of the proprietors at an extraordinary meeting to be held immediately after the close of the ordinary meeting, Feb. 9.

CHARLES CARPENTER,
Chairman.

South Suburban Gas Company.

Directors' Report for 1932.

The sales of gas during the year have been adversely affected by the general depression, and show a reduction of slightly over ½% compared with the previous year. The additional consumers number 8240.

The Directors recommend payment for the second half-year of a dividend of 3% on the 5% ordinary stock, less income-tax, making the dividend for the year 6%, leaving the sum of £1279 8s. 2d. to be carried forward to the next account.

Tenders were invited in June last for £200,000 of 5% perpetual debenture stock and in October last for £100,000 of 4% perpetual debenture stock and £300,000 of 4% perpetual preference stock, the allotments being at average prices of £105 10s. for the 5% debenture stock, £103 5s. for the 4% debenture stock, and £101 2s. for the 4% preference stock.

The Bill promoted by the Company in the last Session of Parliament received the Royal Assent on July 12, 1932, and came into operation on Jan. 1, 1933, at which date the Undertakings of the Sevenoaks and Tonbridge Gas Companies were taken over.

A Bill is now before Parliament for the purpose of empowering the Company to charge differential prices for gas in certain parts of their limits of supply, and for other purposes, and will be submitted for approval at the extraordinary meeting following the ordinary meeting (Feb. 10).

The posts of General Manager and Secretary have been separated. Mr. Wilfrid Wastell retains his position as General Manager, and Mr. T. Brown has been appointed Secretary. Mr. Vernon Simmonds succeeds the late Mr. F. G. Gorman as Engineer.

CHARLES CARPENTER,
Chairman.

Coroner's Gas Chandelier Warning.

A warning against the use of old-fashioned gas chandeliers was given at an inquest at Stockton last week on John Joseph Eggett (74), who died in hospital on Jan. 31 from injuries received in a gas explosion in his home on Jan. 20.

Mr. W. W. Atley, Manager to the Stockton Gas Department, explained the working of a chandelier at the house, and said that wherever he found one of that type he advised the people to whom it belonged to get rid of it.

Returning a verdict that death was from pneumonia following burns caused by an explosion, the Deputy-Coroner (Mr. N. Graham) said that he hoped people would

THE NEWS—*continued.*

read Mr. Atley's advice to get rid of dangerous, old-fashioned chandeliers.

Margaret Green said that, after discovering an escape in the front room, her grandfather turned off the gas at the meter. An old-fashioned chandelier in the centre of the room had broken down, and after he had repaired it Eggett climbed some steps to fill the balance tube with water. She held a lighted candle up for him to see what he was doing, and immediately there was an explosion.

Gas-Driven 'Buses in Newcastle.

A scheme for the substitution of gas for petrol in motor vehicles has been completed by the technical staff of Newcastle-upon-Tyne and Gateshead Gas Company.

Experiments which have been carried out in conjunction with the Northern General Transport Company show that whereas the cost of petrol is 1s. 7½d. per gallon, the amount of gas used is in the proportion of 8½d. per gallon.

A standard chassis of the 'bus company has been equipped to burn gas and has been running in the district for three months, and is shortly to take its place on the ordinary passenger service.

At present a 'bus will travel about 70 miles on one charge of gas. If all passenger-carrying 'buses in the district were to run on gas fuel it is estimated that about 70,000 tons of coal per annum would be required for the manufacture of the gas.

An Account of an Explosion.

"An explosion at the South Metropolitan Gas-Works, Old Kent Road, S.E., caused alarm among people living in surrounding streets this afternoon," stated the "Evening Standard" of Feb. 1. "The noise of the explosion," it continued, "could be heard as far as New Cross. The Gas Company's Fire Brigade was called out. The police assured people in surrounding houses that there was nothing to be afraid of, and that an outbreak of fire had been restricted to where it originated. A woman living near said that ornaments and crockery on a chest of drawers were thrown to the ground and smashed in the explosion."

We learn that what actually happened was that during the process of repairing one of the smaller gasholders a gust of wind blew the retaining water out of the safety seal, with the result that some of the gas escaped and ignited; but there was no damage whatever to persons or property, and not even a window was broken.

Town Gas for Toronto's Industries.

The following information is from "Gasatack," a bulletin for the Sales Department of the Consumers' Gas Company of Toronto.

The great bulk of Toronto's candy supply is prepared on gas-fired furnaces.

To begin with, gas has the great natural advantage of cleanliness, which recommends it particularly to an industry connected with the preparation of food. But this initial advantage, possessed by gas, would not in itself be sufficient to ensure the almost universal acceptance which it now enjoys. Its present wide use is largely the result of improvement in furnaces.

The modern gas-fired candy furnace is remarkable for flexibility and ease of control, and there is a model, recently developed, which meets all the requirements of mass production.

A furnace of this type can prepare 80 lbs. of cream or caramel filling in twelve minutes and can repeat the performance as fast as the material can be fed to it. This gives some idea of the enormous production which gas and good appliances together make possible.

A cutting and profiling machine using town gas and oxygen, which was developed by Messrs. Hancock & Co., of Croydon, is offered for work from ¼ in. up to 8 in. in thickness, and among the advantages claimed for it are: Square edge cuts; cutting operation does not harden the steel adjacent to the cut; uses town gas at ordinary mains pressure (no booster required); cuts with such accuracy that very little finishing work is necessary; the flame is not as hard on the eye as the flame developed in machines using other gases; economy of operating cost.

Coal gas of good quality provides just about the right amount of heat for successful cutting. The flame is not easily mishandled, and is thus suitable for use by comparatively inexperienced operators. The chief features in which coal gas and oxygen machine cutting differs from cutting with the hand torch are the rigidly held cutter and the uniform rate of travel—a remarkably smooth and accurate cut being produced at a much faster rate than with hand cutting.

Failure of Scottish Coal Products, Ltd.

The statutory first meetings of the creditors and shareholders of Scottish Coal Products, Ltd., were held last week at Bankruptcy Buildings, Carey Street, W.C. A statement of affairs was submitted showing liabilities £23,978, assets £5601, and a deficiency of £277,608 with regard to contributories, the issued capital amounting to £260,081.

The Company was formed as a public company in October, 1928, to acquire the undertaking of the Gorehill Coal Company and Mr. William Hunter's various processes and patent rights relative to the production of oil from coal and allied materials, and to carry on business as distillers of coal and coal products and manufacturers of bye-products from coal.

In October, 1928, the Company agreed to purchase (1) from Technical Oils, Ltd., specified plant and machinery for £75,000 to be returned in payment for shares of the Company; (2) the goodwill and assets of the Gorehill Coal Company, Arden, for £27,500 in cash and shares; and (3) certain patents, patent applications, and processes relative to the production of oil from coal and allied materials for £112,500 in cash and shares.

By an agreement dated Oct. 10, 1928, the Company was to supply Shell-Mex, Ltd., with not less than 2,000,000, nor more than 4,000,000 gallons of a motor spirit produced by it. The Company failed to produce any motor spirit, and the agreement was not carried out.

The failure of the Company is attributed to insufficient capital with which to carry through its programme. In the opinion of the Official Receiver the Directors should not have gone to allotment before ascertaining that proper arrangements had been made for the obtaining of capital.

Deaths from Electric Shock.

A Liverpool girl, Mary Elizabeth Bonner, aged 17, of Fulwood Road, on going for a bath on Jan. 29, took with her an electric heater to warm the bathroom. A few minutes later her mother, hearing screams, forced the door of the bathroom and found the girl unconscious in the bath with the heater on top of her. She was taken to hospital, where she died.

An electric hairdrier caused the death of Nora Eileen Smith, 23, an unemployed hairdresser, of Elland, Yorkshire, who was killed in a bath, it was stated at the inquest on Jan. 30, when a verdict of "Accidental death" was returned. Her father said she took a book and the hair-drier to the bathroom. When found she had the drier in her right hand and the book was at the end of the bath. When he touched her he got a shock himself, the handle of the drier being saturated and the current still on. A doctor said he thought that a faulty flex had come in contact with the water. In the case of a faulty flex an iron bath filled with water was one of the most perfect earths possible. The drier, which the girl had had for two years, was poorly insulated.

Shortly after Mr. Edward Horatio Thew, 39, of Moorside, Fenham, Newcastle, had gone to have a bath on Sunday of last week his mother smelled burning and found him unconscious on top of an overturned electric radiator. His clothes had caught fire and he was badly burned. He died almost immediately. It is believed that Mr. Thew, who was recovering from an attack of influenza, fainted and fell over the radiator.

Calorific Value of Edinburgh Gas.

As mentioned in the "JOURNAL" last week, the Edinburgh Gas Department has decided to supply, as from Feb. 15, gas of 475 B.Th.U. per c.ft. instead of 500 B.Th.U. as at present. In compliance with the Gas Regulation Act, every consumer has to be notified of the change, and this has not unnaturally caused some misunderstanding.

In connection with the matter the local papers have made investigations, as a result of which they assure readers that all is well. One paper points out that when the value of "residuals" is high the gaseous therms become less important, and *vice versa*. "This flexibility in the manufacture of gas is one of the reasons why the process of carbonization is so highly efficient in the conversion of the coal into solid, liquid, and gaseous fuel. It also stabilizes the price at which gas can be supplied to the consumer, in

so far as a slump in the price of residuals, instead of meaning an increase in the price of gas, to compensate for this loss more gas can be extracted from the ton of coal and less residuals produced. . . .

"The alteration will in no way affect the consumers financially, as the price per therm will remain the same.

"Consumers' attention is also directed to the fact that gas is the only fuel which is supplied under Government supervision which provides for an independent check being carried out, and the gas supply in Edinburgh is tested by an independent Gas Examiner, under Government control, twice every day. It will thus be seen that the interests of the consumers are safeguarded in every way.

"It is also explained that, as the Gas Department is anxious that its consumers should obtain the cheapest possible supply consistent with the best service which gaseous fuel can render, everything possible is done to continue and extend the use of gas and to cultivate the goodwill of the gas consumers."

Ewart & Son, Ltd.

During 1932 industry has been faced with many difficulties, states the annual report of Messrs. Ewart & Son, Ltd., of Euston Road, N.W. 1, and general adverse trading conditions have had to be faced. The Directors are pleased to be able to report that the trading of the Company has been fairly well maintained, and that after making full provision for all bad and doubtful debts and contingencies, the net profit earned amounts to £26,889, which is available for distribution. To this falls to be added £12,154, the amount brought forward from last year, making a total of £39,044.

The Directors recommend that a payment of the preference dividend of 16% for the year (less income-tax) be confirmed and a dividend of 17½% on the ordinary shares for the year be declared and paid (less income-tax). This will leave the sum of £9042 to be carried forward to the next account.

The Directors report the Company's factories and plant continue to be maintained in good and efficient condition and the Company's name for high quality manufacture has been upheld and retains the reputation gained since the establishment of the firm 99 years ago, in 1834.

Municipal Tenants and Restriction.

At a meeting yesterday the London County Council considered a report of the General Purposes Committee, who explained that the Commercial Gas Bill and the Gas Light and Coke Company Bill, of which notice has been given in the present session of Parliament, contain provisions seeking to prevent housing authorities in connection with the selling, leasing, letting, or other disposal of houses or other buildings or lands belonging or leased to them within the Companies' respective limits of supply, from imposing restrictions as to the form of light, heat, or power to be used therein, or from giving any preference to any person on account of his taking a supply of light, heat, or power of any particular form from any particular local authority, company, or other body. The Bills also seek to annul any such restrictions imposed before or after the passing of the intended Acts. The Gas Light and Coke Company Bill contains a further provision, the effect of which may be to remove the necessity for the Company obtaining the owners' consent to the fitting of pipes and other apparatus to property for the purpose of supply.

The Council, on Feb. 17, 1931, resolved—

> That, as far as practicable, it is desirable, provided that no additional charge on the rates is involved thereby, that equal opportunity should be given to gas companies and electricity supply authorities to install their services in the Council's dwellings, and that the Council's tenants should be afforded freedom of choice in the use, whenever available, of gas or electricity, or both.

The Gas Companies, however, stated the Committee, now seek, by means of statutory provisions as sought by these Bills, the full effect of which it is difficult to foresee, to limit the freedom of action of local authorities in dealing with their own properties.

The Housing Committee are apprehensive that the provisions of the Bill, if enacted, might result in additional expense being imposed on housing authorities or their tenants. They feel very strongly that the housing work of the Council should not be hampered by such provisions, and they see no reason why local authorities should, as landlords, be placed in any different position in regard to this matter from that of other owners of property. The General Purposes Committee concur in this view.

Moreover, they state, the provisions of the Bills are not confined to houses provided by local authorities in the performance of their duties under the Housing Acts, but apply to every other building owned or leased by them. The Committee recommend:

> That, in relation to the Commercial Gas Bill and the Gas Light and Coke Company Bill, the Council is of opinion that the rights of local authorities as landlords should not be restricted by statute in regard to the form of light, heat, power or energy to be supplied or used in buildings owned or controlled by them.

The Colonial Gas Association Gold Medal.

The Colonial Gas Association, Ltd., offered, and the Australian Gas Institute accepted, a Gold Medal for the best paper, from the viewpoint of the smaller works, presented at the annual meetings of the Institute. The first award was made at the recent annual convention of the Institute, held in Sydney.

The Gold Medal, obverse and reverse of which are reproduced here, is both a handsome trophy and an excellent symbol of the Gas Industry. On the right of the obverse will be seen the pit-head, indicative of the Industry's source of its raw material—coal—and though not in strict order of progress, the various units of plant are shown, from the retort house and allied plant to the gasholder, which in most civilized countries is both a familiar landmark and an evidence of true fuel economy. In the Medal, while the gasholder, rightly, occupies its usually prominent place, the conventional torch or flambeau is presented in bolder relief, and so dominates the Medal. This torch conveys the idea of light and heat, and points to the practical utility of the Gas Industry. The Medal is a beautiful piece of work.

The title of the winning paper—a thoroughly practical contribution—was "The Best Retort House Practice for Small Works," contributed by Mr. Tom Johnson, Works Superintendent of the Osborne Works of the South Australian Gas Company, Adelaide.

Just before the close of the convention, the presentation ceremony was performed. The President of the Institute asked Mr. P. C. Holmes Hunt, as Chairman of Directors of the Colonial Gas Association, to make the presentation.

Mr. HUNT, in the course of his remarks, said:

The Colonial Gas Association has felt very keenly the fact that this Institute did accept this offer. Like many other institutions in the Gas Industry, this particular Company is not out purely and simply to make revenue. It is out to assist and develop the Industry; and being particularly associated with small works, some 26 in number, of which some three or four may be classified as in the higher ranks, it felt that it could be of assistance to the Industry and to the members of this Institute if it offered, for competition for friendly rivalry among the members, a Gold Medal with one qualification only—viz., that the paper awarded as the Prize Paper should be on a subject of usefulness and attraction to the smaller companies. The practical experience of the Industry shows that the large undertakings are able to engage officers to be employed solely on developmental work, whether of a technical or a commercial character. It is not easy for these very small works to do likewise. In suggesting that there should be a competition every year on a subject to be set, it is thought that it would be a help to bring out the best not only among the managers of small works, but among the whole personnel of the Industry in Australia as represented by members of this Institute. The Directors of the Colonial Gas Association have made it their business to endeavour to produce for the acceptance of this Institute a Medal which is well worth winning.

THE NEWS—continued.

A Series of Explosions.

People living in the St. Mary's Butts district, Reading, had a trying experience on the evening of Jan. 30, when there was a series of explosions, due probably to the igniting of gas, either sewer gas or that from the mains, by some means not yet discovered. The first explosion came soon after 9.30, and then followed five others within a few minutes. The heavy iron covers from the manholes, reinforced concrete used to line the manholes, and large sections of the roadway and pavement were blown yards into the air, while windows on premises within a radius of 150 yards were shattered.

Considering the extent of the damage it was remarkable that no serious personal damage was done, the only "casualties" reported being a man whose face was cut by flying glass and a young woman who fell into a cavity, and who, apart from shock and a bruised leg, was little the worse for her adventure.

Redemption of Edinburgh's Gas Annuities.

On the recommendation of the Treasurer's Committee, the Edinburgh Town Council on Feb. 3 agreed to redeem the Edinburgh and Leith Corporations' gas annuities. The resolution to redeem the annuities is explained as the first step in the final wiping out of the payment of annuities by the Corporation.

In the early days of municipalization, when the communities of Scotland were acquiring control of such undertakings as water and gas—vital communal services—a favourite method of payment of the purchase price was the creation of annuities. The idea was that the purchasing authority engaged to pay to the shareholders of the company being bought out annual sums called "annuities." These annuities were roughly equivalent to the interest which would have been earned on the purchase price had it been paid outright to the shareholders. The advantage of the issue of annuities was that the purchasing authority did not have to find the capital at the time of acquisition. The redemption of the purchase price was left till later, and this was done in the case of the Edinburgh Water Works some years ago. The turn of the gas annuities came along now when interest rates were favourable, and accordingly advantage was being taken of the statutory right vested in the Corporation. It so happened that the annuities might be paid off in terms of the Gas Acts on practically a 3½% basis, and, as money was available to the Corporation at that rate or under, there would be no extra burden on the ratepayers or consumers.

There was the marked advantage that a permanent liability was being transferred into a temporary one, one which could be paid and would be paid off in terms of the local Act by 1960. The total amount involved is £446,184, and will be met either by realizing investments or by substituting securities. The financial position nearer May will have an important bearing on the manner in which the payment of £446,184 will be financed.

Functions and Training of the Chemical Engineer.

The fifth lecture on "The Trend of Modern Engineering," arranged by the Royal Scottish Society of Arts, was given yesterday in Edinburgh by Dr. R. Lessing. In the course of his address Dr. Lessing said:

Chemical engineering constitutes a definite branch of engineering. On the human side it demands a consideration of the definition, function, professional status, and training of the chemical engineer, a subject of much controversy. In the opinion of many, he is merely a hybrid between the two professions, and they consider the attempt to combine the vocation of both chemist and engineer in one person as over-ambitious. For while the master mind of a Leonardo da Vinci could encompass all the arts and sciences of his day, even a genius of his greatness could not hope in this age of specialization to comprehend a multiplicity of sciences or exercise the professional functions of their applications. However, chemical engineering, being a borderline subject, requires specialized treatment.

The essential difference between the chemist and engineer is one of mentality and outlook. The chemist is taught to acquire knowledge, and spends his life in adding to this knowledge by "finding out things." The engineer is encouraged during his studies and forced in his working life to "do things." His attitude is to get on with the job while the chemist is still busy investigating the working conditions under which the process must be operated to be successful.

The chemical engineer must be competent to bridge the gap between the two. He must possess sufficient imagination to visualize the connection between the behaviour of atoms and molecules in his test tube and that of many tons in the commercial plant. On the whole, it is easier for a chemist of the right personality and some mechanical aptitude to grasp the principles of engineering than for the engineer to fathom the subtleties of chemical theory, to appreciate the significance of chemical reactions, or even to understand the chemist's language. The tendency in the past was to recruit chemical engineers from the ranks of chemists, but they had to acquire a working knowledge of engineering matters by that laborious and wasteful method of self-instruction, practical experience.

The exigencies of the war for the speedy design, erection, and starting-up of chemical plant indicated the need for a short-cut. It was realized that those who in the future would be responsible for planning and operating chemical processes should go out into the world and start their industrial career fully equipped with the special knowledge required for this work.

Chemical engineering departments were, therefore, created at three Colleges of the University of London and elsewhere. Contrary to the American ideas, where early specialization is insisted upon, the British method hitherto has been to teach the subject in post-graduate courses.

Only the future will show the value of this special training and whether the representatives of the profession will be successful in forging a bond of sympathy between the chemist and the engineer.

Eighth List of Bookings for Film "Tar."

Feb.	16-18.	—Tivoli, High Shields.
,,	,,	Lyric, Ardrossan.
,,	,,	Picture House, Paignton.
,,	20-22.	—Theatre Royal, Deal.
,,	,,	Carlton, Westgate-on-Sea.
,,	23-25.	—Picture House, Sanquhar.
March	6-8.	—Empire, Accrington.
,,	9-11.	—Savoy, Hayling Island.

Petrol from Coal.

In his Presidential Address at the annual meeting of the Institution of Mining Engineers on Jan. 25, Mr. John Brass said that, in spite of the handicaps of the Coal Mines Act and the Coal Mines Reorganization Commission in discouraging proper development and the expenditure of capital for rational expansion, costs of production had been steadily lowered, accident rates reduced, and output per individual increased.

In no industry, he continued, was there more research work done, or more money spent on it, than in the coal industry. There were many outside the industry who from mercenary or altruistic motives had prematurely or falsely interpreted the results of research, and who posed as competent advisers and were accepted as such by the public. In consequence the public had been gravely misled on many occasions, and the industry had suffered much from such interference.

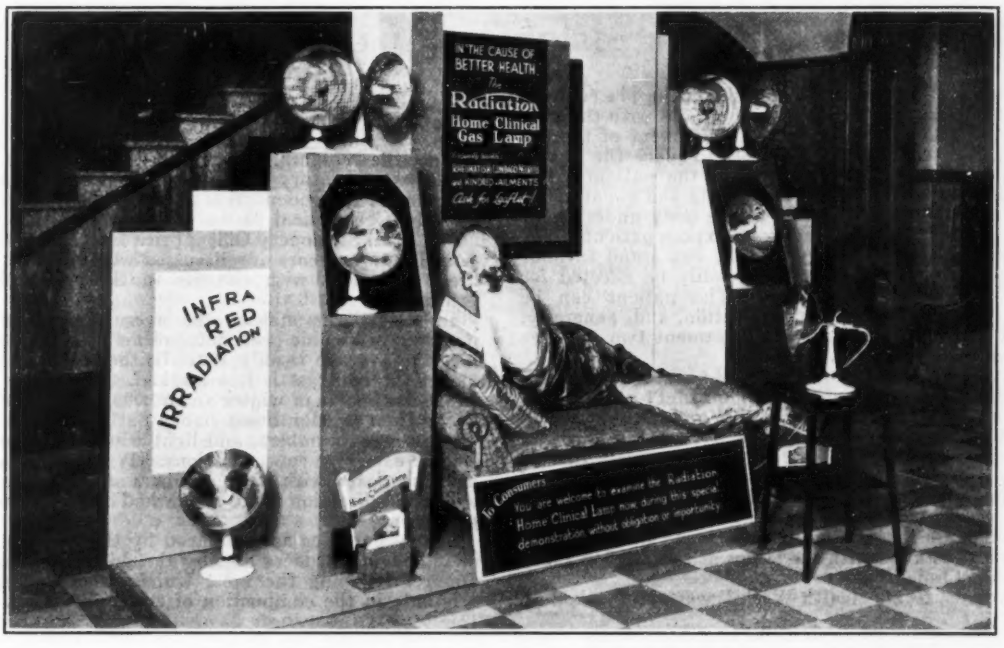
Mining engineers and the coal industry had been berated for not accepting the hydrogenation process promptly and enthusiastically, but it should be realized that, apart from the loss in revenue to the Government, unless the petrol tax was maintained at a comparatively high level, definite and perhaps serious losses would be incurred. The cost of delivering petrol into storage at British ports was in the neighbourhood of 2d. a gallon, whereas the cost of production by hydrogenation was approximately 7d. a gallon. Up to the present none of the oil obtained from coal by any process could take the place of imported fuel-oil for use in Diesel engines.

To make the 1,000,000,000 gallons of petrol imported annually would require the use of 13,000,000 tons of coal, and an expenditure of £142,000,000 on plant. On this basis permanent employment would be provided for 104,000 hands, including 55,000 in and about the mines, but considerable unemployment would be created among British seamen, dockworkers, shipyard workers, and all connected with the shipping of oil. At the present rate of taxation the loss in revenue to the Government would be £33,000,000.

The potential annual output of coal in Britain was estimated to be over 300,000,000 tons, and the actual output in 1931 was 224,000,000 tons. Excess productive capacity was at least 76,000,000 tons, and if 13,000,000 tons were used to produce all petrol requirements it would only represent 17% of our excess productive capacity.

CROYDON'S HOME HEALTH WEEK

A Striking Display of Home Clinical Gas Lamps


IN THE CAUSE OF BETTER HEALTH
Radiation
Home Clinical Gas Lamp
INFRA RED IRRADIATION
To Consumers
You are welcome to examine the Radiation Home Clinical Lamp now during this special demonstration without obligation or opportunity.

DISPLAY OF CLINICAL GAS LAMPS BY THE CROYDON GAS COMPANY.

The Croydon Gas Company, last week, staged a very effective display in their Chief Showrooms in Katharine Street, Croydon, which they aptly described as " Health in the Home " week.

This display, which was arranged in conjunction with Messrs. Radiation Ltd., prominently featured, just inside the main door of the Showroom, a large number of the latest type of small clinical gas lamps, manufactured by the Davis Gas Stove Company. These were arranged in an attractive manner round a central cut-out figure, as the accompanying photograph shows, and most of the lamps were connected up and in operation and placed in such a way that the infra-red rays were directed upon customers who entered the building. Some eighteen lamps in all were included in the main display, together with appropriate slogans, literature, and posters, pointing out how these appliances afford a splendid method of home treatment for such complaints as rheumatism, neuritis, acne, and kindred troubles. Every opportunity was taken of impressing on the public that gas is good for health.

At the same time, further lamps were displayed in the various windows of the showroom, while two windows were devoted entirely to forceful displays to indicate the applications of the lamps, these being lighted up at nights to shine upon cut-out figures in a very realistic manner. Valuable co-operation by local furnishing companies assisted the Gas Company in completing the general effect, and an expert demonstrator was present throughout the period of the exhibition.

The majority of the lamps exhibited were of the small type on a porcelain stand suitable for home use, but an example was also shown of the larger type on an extended stand for medical clinics and similar applications. The lamps are complete with stand, wire guard, and special flexible rubber tubing designed to avoid the possibility of the flame being extinguished as a result of the tube being pinched or trodden on accidentally.

General Description of Lamp.

A general description of this clinical gas lamp may be of interest to our readers. The gas is burnt in such a way as to produce a highly aerated bunsen flame. Combustion takes place within and on the outer surface of a refractory radiant specially treated with a compound of silica, clay, and other inorganic compounds which ensures increased emission of short infra-red energy and the provision of heat of good penetrative value. The incandescent radiant is situated near the focus of a parabolic mirror, so that the emitted energy travels outwards in a slowly diverging beam. The material of the reflector has been selected to ensure low absorption of the higher frequency energy. The gas and air supplies to the burner are adjusted by means of

One of the Croydon Company's Clinical Gas Lamp Window Displays.

regulators provided at the end of the mixing tube which projects through the back of the reflector.

It is now generally recognized that radiant heat rich in short infra-red rays is beneficial to health. Such rays penetrate the outer layer of the skin and stimulate the circulation of the blood in the minute capillaries just below the surface, which alleviates the pain and discomfort of

rheumatism, lumbago, neuritis, &c., while treatment with these rays is successful in cases of acne, boils, and similar complaints. Hitherto sufferers from these troubles have received irradiation treatment in hospitals and clinics; but this Radiation home clinical gas lamp and heater now makes treatment available in the home and at very small cost. It is so simple and safe that anyone can use it with complete confidence. It is merely necessary to light the lamp, adjust it to the most comfortable position, and expose the affected part to the rays.

A further advantage of the lamp is that, when it is not being used for actual treatment purposes, it can be employed as a very efficient portable heater in any room where there is a gas supply.

Method of Use.

The distance at which the heater should be placed from the patient varies from person to person and with the part of the body exposed. With normal adjustment of the gas supply it will often be found suitable to place the heater from 2 ft. to 2 ft. 6 in. distant from the patient. The object is to effect a high degree of flushing and sweating by general irradiation of the portion of the body under treatment, and it is desirable, therefore, to expose patients to as high a concentration of energy as they can stand without undue discomfort. Treatment can readily be effected for an hour, or longer, if necessary. The patient can be irradiated in a sitting or reclining position, and, generally, it is found desirable to repeat the treatment two or three times a week, or even daily.

Commenting on the apparatus, Sir Leonard Hill, M.B., LL.D., F.R.S., Supervisor of the London Light and Electrical Clinic, says: "This lamp is durable and cheap. It will run for five hours at a cost of one penny, and it affords an efficient source of red and short infra-red rays, as well as dark heat. . . . By means of these lamps several cases of chronic rheumatism have been treated with resulting alleviation of pain and improvement of stiff and swelling joints; in one case a severe eruption of acne was removed. A ward is now installed with the lamps at the London Light and Electrical Clinic."

The Croydon "Home Health Week" was ably backed up by advertisements which appeared in the local Press, explaining how exposures of 20 to 60 minutes each day should be sufficient to give relief from pain and discomfort, and we understand that a considerable amount of interest has been stimulated in these appliances.

The Croydon Gas Company, and those firms co-operating with them, are to be congratulated upon staging this very effective display. There should be a very useful future in these clinical gas lamps, and, in drawing attention to gas as a definite source of health by means of a "concentrated" display, the Croydon Company have not only done a public service in their district, but have put forward a valuable suggestion to the Gas Industry as a whole.

BOOK REVIEW

SMOKE PARTICLES AND CONDENSATION NUCLEI.

Since the beginning of 1928, observations have been made at Kew Observatory of the number of smoke particles and the number of condensation nuclei which are present in the air. In Geophysical Memoirs No. 57 (by H. L. Wright, M.A., H.M. Stationery Office; price 1s. 3d. net) the observations for three years are discussed with special reference to their variations with changes in the meteorological elements.

In the winter months the average number of smoke particles in a cubic centimetre of air is 1367, while in summer the average is only 180. In the case of condensation nuclei the contrast is less marked, there being 38,000 per cubic centimetre in winter and 20,000 in summer. Easterly winds from London bring smoke particles to Kew Observatory in great numbers, and light winds from any direction lead to excessive concentrations. While easterly winds are also associated with large numbers of nuclei the distinction with wind direction is not so marked as in the case of smoke particles.

Smoke particles are produced by the combustion of coal in industrial furnaces and by the domestic fire, the latter apparently being the most fruitful source, while nuclei originate in the combustion of coal and of gas.

WATERLESS GASHOLDERS

A New Construction Principle

F. Naujocks in "Das Gas- und Wasserfach," 1933, 76, 66-68 (Jan. 28) describes the waterless gasholder erected at the Berlin Bernau Gas-Works by the Bamag-Meguin A.G.

The holder is the first of its type and has a useful capacity of 70,000 c.ft. It is cylindrical in form. One of the main novel features is the method by which sealing of the piston is achieved. This is effected by means of two leather pads, semi-tubular in form and suitably mounted. The central portion of the leather is forced against the inner wall of the holder by internal oil pressure. At the same time, lubrication of the wall and an effective seal are maintained by the agency of some of the oil which percolates through the leather. The sealing pads are situated one above the other and only the upper one is in use, the lower one being a stand-by.

The leather, which was treated with chromic acid before being tanned, was subjected to a variety of severe simulated service tests and showed itself to be in all respects satisfactory. The piston has a dome-shaped top around which is a 4-ft. high framework to which the sealing pads are attached. At the centre of the top of the dome is a tank 6 ft. 6 in. in diameter and 2 ft. 3 in. high, three-quarters filled with a mineral oil. From it lead two pipes, one to each sealing ring, the oil pressure being equivalent to a head of about 5 ft. The nuts and bolts which attach the sealing rings to the dome framework are readily accessible and the sealing system is completely visible.

The oil percolating through the leather and running down the inside of the holder wall, which is thereby protected against corrosion, is collected and passes by way of a seal and filter to a tank, from which it is pumped once a day into an overhead tank on the top of a stairway situated alongside the holder. Thence it proceeds to the tank on the piston. The oil throughput for the holder in question varies between about 20 and 60 gallons per day, depending on the atmospheric temperature.

The piston is guided by two superimposed tiers of rollers, each containing 20 wooden rollers. The piston itself throws a pressure of about 8 in. of water. The dome of the piston is, however, extended downwards as a cylindrical portion, the bottom of which is bent round to form a channel into which oil may be passed to increase the pressure.

The air above the piston is quite odourless and free from gas. The holder is covered with a light dome-shaped roof provided with a sufficiency of windows to give ample illumination, and a central ventilator. Two bleeder pipes are arranged at the opposite sides of the holder and serve to discharge to atmosphere any gas which may be admitted to the holder after the piston has reached its highest position. The shell of the holder is reinforced vertically by ten double T-ribs and horizontally by three equally spaced platforms and rings of T-iron. Access manholes and a series of inspection windows are provided at the bottom of the holder shell.

The top of the stairway referred to above is roofed over to form a chamber containing, in addition to the oil tank, the drive for an electric lift which runs inside the holder above the piston. The lift, which holds two persons, has a speed of about 8 inches per second. As a stand-by, a hand drive is provided in addition to a rope ladder.

The holder is earthed in several places as a precaution against lighting.

The contents of the holder are shown by a mechanical indicator and alarm signals come into action when the piston is at its uppermost or lowermost positions. The only attention required consists in a daily verification that the tank on the piston contains sufficient oil for the next 24 hours.

The holder was worked for six months on air and since then has been for more than seven months on gas without any troubles either in excessively cold or excessively hot weather.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Application of Gas to the Tinplate and Sheet Industries*

By A. D. Howells, Neath.

Production of Tinplates: Local Method.

Bars of steel, 7 to 10 in. wide by $\frac{3}{8}$ in. to $\frac{7}{8}$ in. and about 20 in. long, are heated to redness (800° C.) in mill furnaces, and then passed in and out of rollers, and are so flattened and lengthened. They are then re-heated in the "finishing" half of the mill furnace, doubled over and rolled, doubled over and rolled again, and again, until the required thickness has been attained. The bars have now become packs of steel sheets, which are next sheared, separated, and "pickled." ("Pickling" means cleaning by immersion, first in acid, then in water.) They have then to be re-heated or "annealed" in sealed iron boxes to soften them and remove "pickling" stains. The sheets, now cold, are again passed through rollers (cold rolls) under great pressure, the object being to produce a good surface. This process makes the sheets hard and rigid, so once more they are re-heated to restore softness and pliability. After a second cleansing of "pickling" similar to the first, the sheets are ready to receive the protecting coat of tin. The protection is achieved by passing each sheet separately through molten tin and palm oil, and then on through machinery which cleanses and brightens what has now become the tinplate.

From the above brief summary it can readily be seen that in the manufacture of tinplates and sheets the chief feature in the various operations is temperature control and furnace atmosphere.

In the industry a fair percentage of what are termed "wasters" are produced, these being imperfect tinplates carrying some defect or blemish due to a number of causes, but principally to poor quality steel, formation of scale during the heating processes (this scale gets rolled into the sheet), streaks caused by coal and dust being deposited on the sheets in the mill furnace and rolled out on to the sheets, poor annealing—*i.e.*, uneven heating, sheets are not heated above the critical temperature (960° C.), with the result that they show poor stamping qualities—tin-house wasters, caused by irregular heating of tin pots, &c.

From the foregoing, it can be seen that gas, an ideal fuel to be used in the tinplate industry, can be employed to advantage by the trade, providing the price of gas and its method of application are such as will enable it to compete with coal when everything is taken into account.

In August, 1931, the Neath Corporation Gas Department, through the Engineer and Manager, Mr. W. Clark Jackson, carried out a number of experiments at one of the local tinplate works, on the heating of tinpots by town gas, and from the results which were obtained by these experiments the Gas Department decided to carry out further experiments on mill furnaces and annealing furnaces.

These experiments form the subject-matter of this paper.

The Neath Corporation Gas Department were approached by a group of tinplate manufacturers in the district to install gas for the heating of their mill furnaces. It was decided to carry out the experiment, using ordinary low-pressure town gas.

Figs. 1 and 2 show the furnace.

There is no doubt that the thermal efficiency of many furnaces can be brought very much higher by pre-heating the air used for combustion of the gas. It was thought that if by any means the influx of cold air through the open door could be prevented, the cost of installing a recuperator would soon more than pay for itself.

The influx of cold air could be stopped by adopting an air screen; the objection to this, however, was that when the sheets were drawn out from the furnace at about 800° C. there would be danger of scaling.

Mr. Jackson and the author devised a scheme to get over this difficulty, and incorporated it in the furnace.

* From a paper before the Wales and Monmouthshire Junior Gas Association at a meeting at Neath on Jan. 28, 1933.

Recuperator.—This consists of a series of 6-in. cast-iron pipes with a blank flange at one end, and another flange bolted to the other end, which is tapped in the centre to take a pipe, while at the side of the 6-in. pipe is a 2-in. branch outlet. A 2-in. tube is inserted into the 6-in. pipe, while a 2-in. tube connects the outlet from the 6-in. pipe to the inlet of the next 2-in. tube. Cold air is blown into the 2-in. tube by a fan, while the waste gases from the furnace circulate around the 6-in. pipes, the pre-heated air

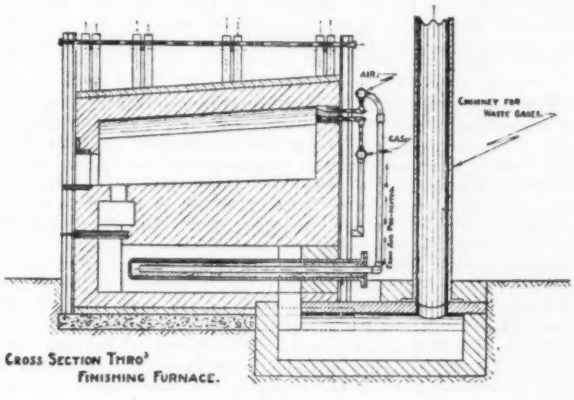


Fig. 1.
Mill Furnace (Town's Gas Fired).
Neath Gas Department's Design.

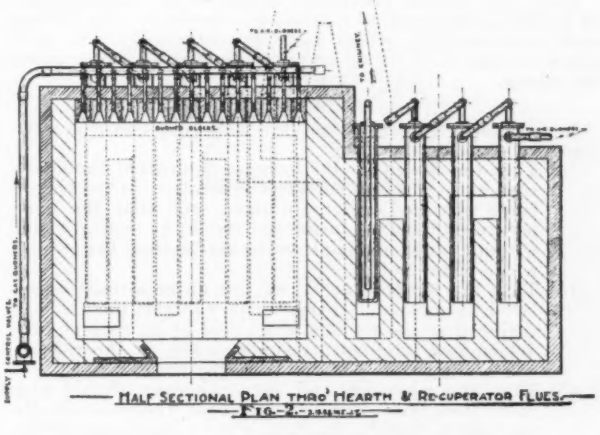


Fig. 2.

from the recuperator being taken into the air main which feeds the burners. This type of recuperator is very simple and efficient. The waste gases travel around the 6-in. pipes and the air inside has a slow travel because of the reduced velocity, owing to the different size of the pipes. Thereby a maximum of heat interchange takes place between the waste gases and the air for combustion.

Burners.—These are made from high-temperature refractory material, and have an air and gas inlet at the back. It can be seen from the drawing that the air inlet is at the top, and the gas inlet at the bottom, the gas rises through a slot, meets the air, and the air-gas mixture is delivered from the wide throat of the burner. Each burner is fitted

with a separate air and gas control, so that the burners can be individually set, and then controlled by a main control cock on the air and gas main. The gas and air cocks are coupled together, thereby enabling adjustments to be made in heat input to the furnace, at the same time maintaining a correct air gas mixture at all positions.

Data—

Calorific value of gas—425 B.Th.U. per c.ft.
Time taken to bring furnace to working temperature from cold—2½ hours.
Gas consumption to bring furnace to working temperature—5700 c.ft. = 24·23 therms.

Working pressures—

Gas pressure—10-tenths W.G.
Air pressure—24-tenths W.G.
Time taken to bring cold charge of steel bars to rolling temperature—30 minutes.
Temperature of roughing furnace—850° C.
Temperature of finishing furnace—830° C.
Temperatures of waste gases—450° C.
Temperature of air from recuperator—420° C.
CO content in waste gases—1%.
Boxes made per hour—10.
Gas consumption per hour—2300—2100 c.ft. = 13·6 therms.
Therms used per box produced, including gas used for lighting up—1·10.

This figure of 1·10 therms per box shows a great improvement over the figure obtained in the first experimental furnace, which was non-recuperative, proving the benefits of recuperation on this improved and re-designed furnace.

Annealing.

The next process in the manufacture of tinplates is that of annealing. This is the most important of the processes and offers a further field for the application of town gas. The Neath Corporation Gas Department is experimenting with the application of gas to a single-sheet annealing or normalizing furnace, the data of which it is not now opportune to give. In the ordinary box annealing process the sheets to be annealed are placed into annealing pots, sealed from the air, and charged into the annealing furnace, where they are subjected to a " soaking heat " for about 12 hours, then withdrawn and allowed to cool down in the atmosphere. During the cooling down period there is a tendency for the outer edges of the sheets to become oxidized. To prevent this oxidation, gas is now being utilized. The annealing pots, after being withdrawn from the furnace, are covered with a mild-steel casing, and town gas flows into the outer chamber, and the air is expelled. This allows the sheets to cool in a gas atmosphere, preventing oxidation and giving to the sheets what is known in the tinplate trade as " silver-finish."

From the outline previously given of the manufacture of tinplates, the next two processes consist of cold rolling and white-pickling, which have no significance in this paper, so that we will pass on to the final process of tinning the sheets.

Tinpots.

In designing the equipment the following features were regarded as being essential:

(*a*) That the design for the burning equipment should be such as to enable a correct temperature in the tinpot being obtained and maintained, and that the temperature of the tin in the pot should be constant and without any material variation across the whole width of the pot.
(*b*) That the temperature should be automatically regulated by means of thermostatic control, thereby ensuring that the tin is always kept at its correct predetermined temperature, independent of the rate at which the sheets pass through the pot.
(*c*) That the wash-pot and grease hopper should also have their own burner equipment thermostatically controlled, thereby regulating the temperature of the grease.
(*d*) That the burner equipment should be capable of melting the tin and heating the palm oil in the minimum time, consistent with the safety of the pot itself.

In regard to the burner equipment itself it was decided that the experiment should be started by using Surface Combustion burners, as made by the Metropolitan Fuel Company, Ltd.

Fig. 3 shows the lay-out of the pot and the position of the burners. It can be seen that there are three burners across the width of both the tinpot and wash-pot. As the tinpot and wash-pot combustors are identical it is only necessary to describe one set.

The three combustors under the tinpot are seated in a cast-iron cradle and they extend across the whole width of the pot and are 20 in. wide, so that the total heating surface is 20 in. by 68 in., 1360 sq. in.

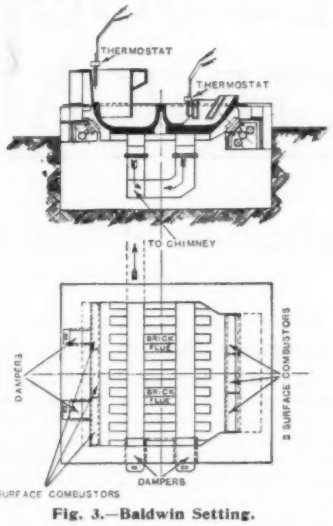


Fig. 3.—Baldwin Setting.

Burner equipment by the Metropolitan Fuel Co., London.

Each combustor has its own separate gas and air supply, which are carried to a mixing chamber situated at the back of the combustor, so that each burner can be individually controlled. The gas supply passes through a governor and diaphragm-controlled valve to a common gas manifold, which is fitted with three tees, each tee to supply one combustor. Air is supplied by a ½ h.p. Keith-Blackman fan to another common air manifold, which again is fitted with three tees to supply air to each combustor, so that there is an air and gas supply to the mixing chamber at the back of the combustor. Every burner is fitted with its own pilot light. When the fan is started the air pressure opens the diaphragm-controlled gas valve, and the air and gas pass to the various combustors, which are lit from the pilot lights. The travel of the products of combustion can be followed from the drawing.

The operation is thermostatically controlled by a MacLaren thermostat, which is immersed in the molten tin and set to the required temperature. When that temperature is attained the current is transmitted to an interchanger to which the thermocouple is connected, and hence to the fan, which stops when the current is shut off by the interchange apparatus, so that the air and gas supply is cut off.

The experiment, within limits, proved satisfactory, and the data obtained are given below:

Heating—

Gas used to bring the pot from cold to working temperatures and including grease hopper = 6000 c.ft. = 25·5 therms.
Total weight of tin heated—4·5 tons.
Total weight of palm oil—1·5 tons.
Time taken to bring pot to working temperatures from cold—4·75 hours.
Temperature of tin raised to 600° F.
Temperature of grease raised to 470° F.

Week's Work—

Number of hours worked during week = 124.
Number of boxes put through, 1275.
Gas used = 98,120 c.ft., or 416·9 therms.
Therms used per box of finished tinplate, 0·32.
Tin yield: 1 lb. 8 ozs. per box.
Amount of scruff per box of tinplate, 7·3 ozs.
No wasters were produced, due to dirty wash-pot or grease defects.
No week-end slow firing in operation.

The results showed that the maximum variation in the heating across the width of the pot was only 3° F. against 67° F. variation in the coal-fired pots. The coating of tin on the sheets was also very much more even than on the sheets from coal-fired pots.

These results proved that the experiment was on the right lines. Nevertheless, the question arose as to whether burner equipment of the nozzle type should be experimented with, seeing that surface combustors were considered to be too fragile for this class of work.

Experience showed that the setting design, apart from the burner equipment, required alteration, so the next experiment was carried out using impact burners, as made by British Furnaces, Ltd., Chesterfield. The setting design

was one got out by Mr. Jackson, and gives much easier control both as regards the initial heating up of the pot and during ordinary working. This design is shown in fig. 4. The experiment was carried out using high-pressure oil gas of 1550 B.Th.U. per c.ft. calorific value. From the drawing it can be seen that the system employed is that of surface combustion. In this particular system perfect combustion is the aim and attainment of the process, and

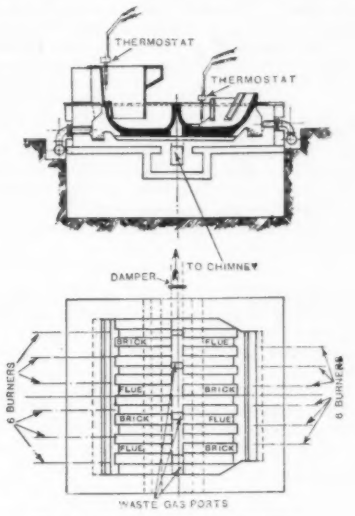


Fig. 4.—Baldwin-Jackson Setting.

Burner equipment by British Furnaces, Ltd., Chesterfield.

tinpots fired by this system depend for their success on six distinct features, which are as follows:

1. An air-gas proportioning system.
2. An air-gas mixing system.
3. A suitably designed burner that cannot during operations light back.
4. The combustion of a homogeneous perfect gas-air mixture in an exceedingly small space on the surface of highly refractory material.
5. The transmission of heat almost entirely by radiation from the refractory material which has been raised to maximum incandescence with the gas available.
6. There is no flame contact with the sides of the pot itself. As the whole layout can be quite easily followed, there is no need to give a detailed description; however, a word or two about the burners and inspirator will not be out of place.

Burners.—These consist of a comparatively large casting having a relatively small outlet, the edge of the latter being the only part exposed to the heat from the combustion chamber. The burner is built tight into the brickwork of the combustion chamber and is protected at the tip by a highly refractory cement. The pressures of the mixtures in these burners are such that the velocity of the gases leaving the burners is sufficient to carry the mixtures on to the refractory material prior to combustion. The velocity is also maintained above that of the propagation of flame in the air-gas mixture, thus eliminating lighting back.

Injector.—As the working gas pressure is a minimum of 2 lbs. per sq. in., a simple automatic proportioning system working on one control dial is used. Gas issuing at a high velocity from a jet at the entrance to a venturi throat entrains from the atmosphere the correct amount of air for perfect combustion. The correctly proportioned mixture is delivered to the burners. The air-gas ratio is determined by the size of the gas jet. The system requires only one pipe of small diameter, to carry gas. The whole of the operation is thermostatically controlled. The principle of the control is briefly this: Interposed in the gas line to the inspirator is the thermostatically controlled valve and by-pass valve. Gas at 2 lbs. per sq. in. pressure (found by experiment the amount necessary for holding consumption when the pot is idle for any reason) is allowed to pass to the inspirator by means of the by-pass, the main control valve now being shut, as the tin in the pot is at its correct pre-determined temperature. Immediately the temperature of the tin begins to fall the thermostat comes into operation and opens the control valve, thereby allowing gas to pass through the main valve in addition to the by-pass, the control valve being set to deliver gas at 5 lbs. per sq. in. pressure. When the temperature of the tin again reaches its pre-determined maximum temperature the thermostatically controlled valve shuts and only the by-pass supplies the gas to the burners; and so the cycle continues. This experiment proved successful, and the results obtained confirmed our opinion that we were progressing in our experiments. The setting design proved so satisfactory that it was decided to standardize it for use for gas firing of tinpots in our district.

The next tinplate works to which gas firing of tinpots was installed was in a district in which oil gas was not yet available, so this gave an opportunity of testing another type of burner equipment of the nozzle type using town gas at ordinary pressures. Fig. 5 shows this particular tinpot and equipment, from which it can be seen that the burner equipment is by Mr. Jackson.

The Baldwin-Jackson burner equipment was designed to be as simple in character as possible, consistent with efficient results. It incorporates the automatic mixture control made by James Keith and Blackman Co., Ltd., which ensures a constant air-gas mixture irrespective of any variation in gas pressure, air pressure, or combustion chamber or flue resistance. The mixture is led to a series of cast-iron nozzles which direct it on to a specially designed bed of refractory material. By this method a considerable amount of heat is transferred into radiant heat, and by causing the products of combustion to change direction by means of the peculiar shape of the refractory bed, a further amount of heat is transmitted in the form of direct contact to the bottom front face of the pot. It will be seen from the drawing that the products of combustion pass underneath the remainder of the tinpot, under the wash-pot, and up to the grease hopper flues to the stack.

In the event of the grease hopper attaining too high a temperature, excess heat can be removed by opening the control flue damper to the required amount.

Here again the operations are thermostatically controlled, the automatic control operating as follows: In the event of the pot tending to over-heat, the thermostat reduces the amount of air gas mixture flowing to the burners and thereby checks the heat input to the tinpot.

When the tin reaches its pre-determined temperature the thermostatic control reverses the operation and allows more air-gas mixture to flow to the burners. It is possible by this method to maintain a pre-determined temperature within 2° F. It is interesting to note that the equipment provides for separate burner equipment for the grease hopper, consisting of small burners across the width of the grease hopper. These are thermostatically controlled and are all alight or all off, as the case may be, and are lighted from a central pilot. The reason for having separate burner equipment for maintaining the grease at the pre-determined temperature is that when the wash-pot burners are brought into operation the tin in the wash-pot is heated to a higher temperature than necessary, merely for the purpose of increasing the temperature of the grease.

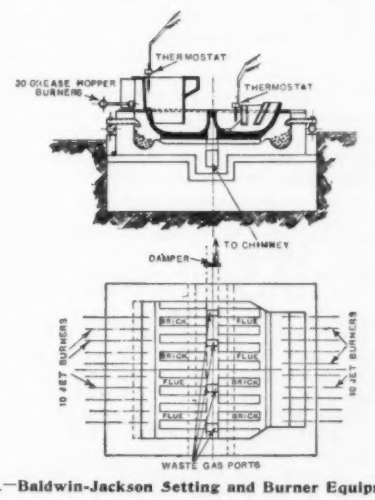


Fig. 5.—Baldwin-Jackson Setting and Burner Equipment.

This latter experiment proved to be the most suitable for tinpot heating. The pot has only worked for the past two weeks, and it is much too early to give any data, but it is showing a higher thermal efficiency than the other types, inasmuch as the gas used per box produced for the second week's work was 0·30 therm compared with 0·32 therm per box from the other experiments on tinpot heating.

Discussion.

Mr. CUNIFFE (Swansea) thought it unfair that the Neath Gas Department should bear the expense of these experiments, and advocated that the gas departments and tinplate manu-

facturers should get together and form a common fund for experimental work. He also referred to the question of thermal yields from the oil gas-fired furnace and town gas-fired furnace.

Mr. HOWELLS replied that closer co-operation between tinplate manufacturers and gas undertakings was the only way in which real progress would be made. In regard to the question of thermal yields, on taking the weight of metal and gas consumed weekly on each furnace the town gas-fired furnace showed a 10% higher thermal efficiency.

Capt. BEVAN (Briton Ferry) referred to the position of the burners, and he thought that these should be placed lower down from the roof and thereby have more heat impact on the steel through direct flame contact. He also thought that it was impossible to prevent oxygen getting into that type of furnace.

Mr. HOWELLS said it was generally considered that for temperatures above 500° C. radiation was the best method of heating, and that if a bunsen burner type of flame were used the roof would very soon be burnt away. As to air getting into the furnace, the method adopted proved very satisfactory and no scaling took place. They aimed at keeping the CO content in the waste gases about 1 or 2%, so that a reducing atmosphere was maintained.

Mr. BAKER (London) suggested that the recuperator should be placed in the roof of the furnace and that the question of making it in brickwork should be looked into.

Mr. HOWELLS thought the recuperator was in the right position—*i.e.*, under the hearth—because by placing it there the waste gases would keep up the temperature of the hearth, on to which the cold work was placed. The suggestion of making the recuperator from brickwork was worth considering. It was pointed out that the furnace explained in the paper was only put up as an experiment, and proved very efficient and cheap to install.

Mr. E. THOMAS (Swansea) stated that the Americans did not use recuperators, and questioned whether it was a paying proposition to install one.

Mr. HOWELLS replied that, from the data and results shown from a recuperative and a non-recuperative furnace, the recuperative furnace had a 10% decrease in gas consumption, so that it definitely paid to employ recuperation.

Mr. CASWELL (Swansea University) said the paper would be of great interest to both tinplate manufacturers and the Gas Industry. He felt sure they were progressing along the right lines, and appealed for closer co-operation between the industries, and suggested that a centre should be set up at Neath or Swansea. He wanted to know if any observations had been made between the difference in temperatures across the hearth of a coal-fired mill furnace and a gas-fired mill furnace.

Mr. HOWELLS replied that the difference in temperature on a coal-fired furnace would be anything up to 100° C., against 5° C. on a gas-fired furnace.

During the discussion congratulations were expressed by speakers generally to Mr. Howells on his paper, and a vote of thanks was heartily accorded him on the proposition of Mr. C. H. COLLINS (Swansea), seconded by Mr. CUNIFFE, and supported by the MAYOR OF NEATH, Mr. E. ABLETT (Swansea), and Mr. CLARK JACKSON.

Prior to the meeting a visit was made to the Vernon Tinplate Works, Briton Ferry, which afforded an opportunity for inspection of the various processes of tinplate manufacture, and particularly the gas-fired mill and the gas-fired tinning pot.

The thanks of the Association to Mr. Clark Jackson, the Neath Gas Department, and the Vernon Tinplate Company were expressed by Mr. C. B. FELTON and Mr. CUNIFFE.

Carbonization with 103-in. Vertical Retorts*

By F. A. RHEAD, B.Sc., Assoc.M.Inst.Gas E., Gas and Water Department, County Borough of Wallasey.

In the past few years there has been a noticeable tendency to construct continuous vertical installations having larger retorts than formerly. At least two of the well-known exponents of vertical practice now build 103-in. retorts, which, owing to their relatively large gas producing capacity, are suited only for use on medium-size or large works, the main objects of this increased size being to effect economies in gas production, capital cost per million, ground space, labour, and maintenance charges.

As only two such installations appear to have been erected in the area covered by this Association, it was felt that a few remarks on the general working of an installation of this type might be of interest to members. The Wallasey installation follows the Woodall-Duckham Vertical Retort and Oven Construction Company's latest practice, has a daily capacity of approximately 2½ million c.ft. of gas at 470 B.Th.U. per c.ft., and was put into service in July, 1932. When the further twelve retorts, for which provision has been made, are installed, making a total of 28 retorts, the daily capacity will be 4½ million c.ft., the horizontal retort bench previously occupying the same ground space having a daily capacity of only 1 million c.ft.

PRODUCER PLANT.

This consists of three four-door external producers of the step-grate type arranged in a separate battery at ground floor level on one side of the retort bench. In general these follow the Woodall-Duckham Company's standard design with the exception that, as a large percentage of breeze is used, the grate area is necessarily larger than had unscreened coke alone been used. The grate area per ton of coal carbonized per day is approximately 20% greater than for producers using only unscreened coke.

The producers are charged at four-hourly intervals from a manually propelled skip filled from the coke, nut, or breeze hopper, as desired. The proportion of breeze in the fuel as charged has been steadily increased since the plant was put to work until in October last 80% of the fuel charged was breeze, and this proportion has since been maintained. It must be clearly understood that in this case breeze represents actual portions of the grade from the rotary coke screens passing through a wire mesh of 1 in. square, and includes all dust.

Tests of fuel consumption with varying proportions of breeze under conditions of carbonizing are as follows:

(1) Sixteen retorts at normal work with 7% scurfing periods.

(2) Two waste-heat boilers in continuous operation.

The figures for "Coal carbonized corrected to all retorts working" are obtained by making the assumption that the fuel required to maintain a retort at scurfing temperature is 75% of that required for carbonizing its normal working throughput of coal, or that the fuel used would efficiently carbonize 75% of the normal daily throughput of coal.

—	Test 1.	Test 2.	Test 3.
Date of test	Aug. 2-16, 1932.	Sept. 1-8, 1932.	Dec. 1-8, 1932.
Breeze 1¼ in.-o in., % of fuel charged	40–50	70	80·0
Average number of skips to producer per day	23·8	25·5	24·2
Average dry weight of one skip fuel, lbs.	1825	1685	1756
Average dry weight of fuel per day, tons	19·38	19·17	19·00
Average throughput per retort per day, tons	9·32	9·17	9·38
Average retorts working per day	13·2	13·2	14·56
Actual coal carbonized per day, tons	123	121	136·6
Fuel used on actual coal carbonized, %	15·65	15·83	13·9
Corrected to all retorts working—			
Coal carbonized, tons	142·6	140·3	146·7
Fuel, %	13·6	13·65	12·95

In practice it has been found that when using 80% of fuel below 1 in. there is a considerable reserve in hand for the maintenance of carbonizing temperatures in the retort bench as governed by the present policy, and that it is more economical to use larger quantities of breeze, as the cost of this, weight for weight, is usually less than half that of unscreened coke.

In addition, there is the further financial advantage brought about by an increased amount of higher priced fuel for sale and a steady outlet for a large proportion of the breeze produced on the rotary screens.

RETORT BENCH.

This section of the plant consists of sixteen retorts each capable of carbonizing 10 tons of coal per day. Dampers are provided on each side of the major axis of each retort for producer gas, secondary air, and waste gas, thereby giving independent heat control of individual retorts.

The retorts are rectangular in cross-section, the faces and combustion chambers being constructed of silica with the exception of the tops and the bottoms, which are of Stourbridge firebrick. Each retort is heated by a set of six vertical combustion flues on each side of the major axis. No regeneration or recuperation is provided for other than that afforded by the straight vertical secondary air flues between the minor axes of opposite retorts. In order to minimize heat loss through radiation, both side walls of the bench are faced for the full depth of the setting with insulated firebricks which are covered with a 2-in. layer of special insulating material. The auxiliary coal hopper for

* From a paper before the Manchester and District Junior Gas Association, meeting at Burnley, Feb. 4.

each retort is provided with two coal valves, a midfeather and two explosion flaps serving to minimize the effects of any possible explosion. The gas leaves the retorts through a cast-iron offtake pipe and passes a mushroom valve before entering the foul main, where it is sprayed with hot liquor.

When the installation was started up no trouble was experienced in any respect. Since the method adopted was very similar to that used for Woodall-Duckham regenerative settings with internal producers, this operation will not be dealt with in detail. During the starting-up period of any type of setting it is absolutely vital to pay strict attention to every detail of the plant and to keep very careful watch on the working of the producers and control of temperatures. For the installation under consideration the producers were regulated so that temperatures obtaining in the settings, as measured by thermometers placed in the centres of the combustion flues at the check-tile level, were increased daily only one half of the permissible temperature increment. In comparison with daily increase of temperature at later periods both before and after lighting up, and with fluctuations under working conditions due to putting retorts to and from scurfing positions and also possible irregular working these increments appear very small, but it must be remembered that the most important expansions of silica due to its allotropic modifications take place below 300° C., and hence very great care is necessary when passing through this range of temperature. As an illustration of the importance of small details the following is of interest. On one occasion it was found that in the case of two retorts a contraction of $\frac{1}{8}$ in. had occurred at each, the remaining ones having increased by $\frac{1}{8}$ in. since the previous reading. Investigation in the case of the one showed the coke discharge door to have been left open, while in the other a loose plug had allowed water to drain from the water sealed coke discharge door, the net result in each case being that cold air had been passing up the retort and thereby caused the contraction.

Gas making was commenced in July, 1932, and it is, therefore, impossible to offer any definite opinion as to the useful life of the retort bench, and the following records as regards working results are those from a new plant. No difficulties have been encountered in starting up or working the plant either on the side of control or of obtaining satisfactory results, which have averaged well above the contractors' guarantee figures.

Heat control has been found to be quite simple having once obtained the correct local conditions. The silica in the settings is guaranteed for working temperatures not exceeding 1450° C., but in practice 1370° C. has been determined by the management as the permissible maximum, any individual flues above this temperature immediately being checked.

The check tiles were all removed before gas making commenced, and it has not been found necessary to replace them, any adjustment between the inside and outside temperatures of the same set of six combustion flues easily being made by the moving of one baffle in the CO distribution flue. Six temperature readings are taken daily for each retort, at the top four corner sight bricks and at the check tile levels; from these individual alterations are made if necessary. In general, with a steady throughput of coal, the only alterations necessary are the opening or closing of the retort CO dampers for increasing or decreasing the retort check tile level temperatures, and the increasing or decreasing of the retort main damper openings for corresponding alterations to retort top sight brick temperatures. It is important to note that while maintaining the check tile temperatures sufficiently high to obtain good steaming efficiency in the retort the main damper temperature should not be allowed to exceed 1000° C., otherwise the fluxing of the flue dust in all probability would cause much trouble with sticking dampers. No such trouble has occurred, care having been taken to keep the temperatures of these dampers in the region of 950° C.

It has been determined that the suitable scurfing cycle for the present working of these retorts is 23 days' working and 48 hours' total scurfing, the corresponding figures for 5-ton continuous vertical retorts on the No. 2 installation carbonizing the same mixture of coals being 42 days and 72 hours respectively. This in all probability is due largely to the fact that the rigidity of the sheet of carbon on the side of the 103-in. retort is far less than that of one of similar thickness on a 53-in. retort; this would therefore break down earlier in the case of the larger retort, giving irregular coal travel. Due regard must also be given to the age of the retorts on the No. 2 Installation and the somewhat lower working temperatures carried. Scurfing temperatures maintained are 1200° to 1250° C. at the top sight bricks and 1000° to 1050° C. at the check tile level.

Before a retort is put into commission after scurfing, the lower 10 ft. is sprayed with "S.P." cement mixed with water to the consistency of thick cream in the proportion of two of cement to one of water by volume. Before being sprayed, the retort is tested for leakage by two methods. The first consists of putting the combustion flues under CO pressure by opening fully the retort CO dampers, closing the retort main dampers, and closing the secondary air slides. The retort top casting cover is removed, thereby creating a chimney effect in the retort, which in the event of leaky joints, pulls into the retort producer gas which can be seen burning. The second test is in effect the reverse of the foregoing one. The retort main dampers are fully opened and the retort CO dampers shut, thus creating a pull in the combustion flues which draws in cold air through any cracks, which become visible as dark lines or areas. Should a leak be discovered by the application of either of these tests it is remedied by ordinary spraying or by the application of a straight jet spray actuated by a quick release valve. It is essential that any material so deposited in a crack or hole be allowed to attain the retort temperature before further additions are made. Up to the present only one coal gas leak into the combustion flues has been observed, that fortunately being of a minor nature, not having been observed since the first treatment by the straight jet spray method.

All retort carbon taken from the retorts during scurfing is carefully examined for adherent refractory material, but so far very little indeed has been found. In fact, it can be said that spalling appears to be practically non-existent, probably due to limiting of permissible heats.

Coals.

At Wallasey, during the last few years, with a view to this installation—which called for a capital expenditure of £45,000—much research and experimental work was carried out on the question of suitable coals. For the year 1932-33 contracts were made for 60,000 tons of gas coal, the whole of which was specified to be screened large coal over $2\frac{1}{2}$ in. mesh, or screened cobbles or nuts, and full analysis was called for from the contractors on a special form of tender for each offer.

It is pleasing to report that no complaint whatever has been necessary regarding any of the twelve selected gas coals, and that the average ash content has been less than 4% with a maximum of 5% from North Wales, and in many cases an average over the twelve months of 2%.

It is only fair to point out that these figures can only have been possible as a result of extremely good working and efficiency at the collieries, and are indicative of the modernization of cleaning plants installed by colliery engineers, to whom credit is due.

By careful and continuous work with the coal wagons a system of mixing for purposes of blending has been carried out with such success that (1) screened coke, (2) domestic nuts, and (3) breeze from the screens has been saleable containing 5% moisture and 7% ash, and testing over 100, 90, and 70 c.ft. to the ton respectively.

The coal carbonized is obtained from the following coalfields in the proportions:

North Wales	46·75 %
Yorkshire	30·65 ,,
Staffordshire	16·10 ,,
Derbyshire	6·50 ,,

Screened gas coal and large nuts only are purchased in the proportions of one of coal to two of nuts respectively. The North Wales coal has been found to give a very high thermal yield of gas but a friable coke; hence careful blending is necessary with coals of high coking value from other districts to obtain carbonizing conditions in the retort for gas production and also a high yield of good quality vertical coke.

The main coal storage bunkers, approximately 25 ft. wide, are filled from an endless rubber band conveyor working centrally. This method of filling, as in most, unfortunately gives rise to segregation of the coal, the larger lumps rolling to the outsides of the bunker while the fines stay in the centre, thus upsetting blending operations. As a result it has been found necessary at times to rod the portions of retorts under the centre of the bunker twice as frequently as those portions under the sides, which normally are done at intervals of one hour.

No retort house governor is fitted, the pressure conditions at the rodding holes at the top of the retorts being controlled by the exhauster governor, which is situated some distance from the retort house, the intervening length of foul main serving to damp out, to a large extent, exhauster ripple. Regular working of retorts is ascertained by observation of the coal travel indicators on the auxiliary coal hoppers, by the amount of coke withdrawn from the coke chambers at two-hourly intervals, by the low temperature of the retort gas offtake pipe as ascertained by touch, and by the wet, tarry condition of the rodding hole plugs on the retort top castings.

Flue cleaning is carried out every second scurfing of a retort—*i.e.*, approximately every seven weeks. The short

period between these cleanings is due to the use of the high proportion of breeze as producer fuel, much longer intervals being possible with the sole use of screened or unscreened coke. Flue cleaning is carried out at the large dust traps between the CO collecting main and the retort CO distribution flues, the internal waste gas flues in the setting only requiring attention every three months.

Carbonizing figures and working results over a period of six months obtained in 1932 are given in the following table:

—	Working Results.
Date of test	6 a.m. July 19, 1932-6 a.m. Jan. 1, 1933.
Total gas made, c.ft. uncorrected	379,399,000
Average calorific value, B.Th.U. per c.ft.	471·0
Total coal carbonized, tons	21,384
Proximate coal analysis—	
Moisture, %	3·0
Volatile matter, %	35·5
Fixed carbon, %	60·4
Ash, %	4·1
Gas made per ton of coal, c.ft.	17,742
Therms per ton of coal carbonized	83·56
Daily average retort throughput, tons	8·98
Average gas made per retort per day, c.ft.	159,500
Average retort temperatures—	
Top, ° C.	1,331
Bottom, ° C.	1,117
Percentage steaming on coal carbonized	13·45
Coke and breeze available for sale per ton of coal carbonized, cwt.	10·20

In considering the figure given for percentage steaming it should be noted that this does not represent the total steam passed through the coal carbonized, as quenching water from coke chamber may be taken as being evaporated to the extent of 7% by weight of the coal, this being counterbalanced to a certain extent by condensation of steam in the quenching water.

It must also be stated that for the last three months of the period this installation has been worked as an independent stream, but in conjunction with the No. 2 installation of vertical retorts, to deal with the full winter load, mixing of the two streams taking place at the inlet to gasholder.

Tar and Liquor.

The following are the results of tests made on the tar and liquor production from the installation:

Tar.

Duration of test	6 a.m. Aug. 1-6 a.m. Oct. 1, 1932
Total tar made	141,200 galls.
Water content by volume	5·1%
Specific gravity	1·090
Coal carbonized	8,124 tons
Tar made per ton of coal carbonized	17·4 galls.

The tar as measured for this test had been treated for disposal to the tar distillers and was not as leaving the separating tank.

Liquor.

Duration of test	6 a.m. July 20-6 a.m. Aug. 9, 1932.
Total liquor made	71,060 galls.
Liquor strength	7·25 oz.
Coal carbonized	2,343 tons 3 cwt.
Liquor made per ton of coal carbonized	30·3 galls. at 7·25 oz. 22·0 galls at 10·0 oz.
Equivalent sulphate of ammonia made per ton of coal carbonized	17·62 lbs.

In view of the present unfavourable state of the ammonia market this low yield of liquor was not altogether unwelcome, and it is known that certain action can be taken to improve this matter when the time is opportune.

It is the intention to keep the installation in continuous work over the next five to six years, with renewals to producers, which can be shut off separately, and other repairs done during the summer months.

Discussion.

Mr. J. H. Clegg (Burnley) asked if there was any appreciable variation in the quality of producer gas between clinkering periods when working on breeze. With the large retorts it would appear that one retort out of action was a large proportion of the whole. Was there any tendency for the coal to run down one side of the retort? Was the figure of 10·2 cwt. of coke the actual amount of coke saleable, or were there any deductions to be made? Mr. Clegg stressed the fact that cost per therm into holder was more important than therms per ton of coal.

Mr. Rhead, in reply, said there was very little variation in the producer gas quality, and that the large retorts, in general, worked more smoothly than the smaller ones. As far as scurfing was concerned, the retort days worked were quite normal, scurfing time being only 7% of the whole. The coke figure allowed for coke to producers, but not that used on works.

Mr. A. K. Collinge (Preston) asked whether the cement spray was used to stop incipient leaks or to protect the silica. Did the deposit build up and interfere with the travel of the coal in the retort? What was the CO_2 content of the coal gas? What was the reason for the short periods between scurfing?

Mr. Rhead said the spray was used to protect the retort face from abrasive action of the coke in the lower 10 ft. of the retort. There was apparently no building up of deposit. The CO_2 content of the gas was normally 3·8%. The plates of scurf on the larger major axis were weaker than in the smaller retorts. This led to breaking away in patches and gave a rough surface, which tended to uneven travel of coal in the retort. The more frequent scurfing eliminated this and gave on the average a more uniform coal throughput.

Mr. H. H. Thomas (Liverpool) proposed a vote of thanks to Mr. Rhead, and asked for further details of the blending of the coal. In his opinion, for useful blending the coal should be less than 1-in. mesh and preferably below ½-in. mesh, especially if the coals were of a widely differing nature. Did not the spraying of a wet slurry tend to cause spalling?

Mr. J. Melling (Radcliffe) seconded the vote of thanks.

Mr. Rhead thanked Mr. Thomas and Mr. Melling for their vote of thanks, and also the members for the way they had received the paper. In reply to Mr. Thomas, he stated that the coal from the different districts was mixed rather than blended. No damage to the brickwork had been noticed. The lower portion of the retort was firebrick, and thus less liable to spalling than silica.

Historical Development of Furnaces*

By H. Southern, A.M.I.Mech.E., A.M.Am.Soc.M.E.

The progress of mankind has been divided by archæologists into three periods of culture—the Stone, Bronze, and Iron Ages. The change from one age to another cannot be defined, but the Bronze Age commenced in Europe and Egypt about 2000 B.C. and the Iron Age in the Near East and Southern Europe about 1000 B.C. There is, however, evidence to show that an art of metallurgy existed 10,000 years ago. By the time of the first Egyptian Dynasty, coeval with 5500 B.C., ewers and basins of copper and beautiful examples of gold jewellery were available for use and adornment.

From that period onwards great advances were made in the working of metals. This is proved by the beautiful statuettes, chains, utensils, and gilt work of the time of Cleopatra, 69-30 B.C.

The Scriptures refer to the working of metals and the use of furnaces, and it is interesting to note that during the translation of the Bible for the Authorized and Revised versions five different words were rendered as "furnace," whereas had they been closely interpreted they would have been translated as large smelting furnace, lime kiln, smelting furnace for refining, crucible furnace, and bakers' oven. It is therefore evident that the peoples of the pre-Christian era had considerable skill in the development of furnaces for specific processes.

The fuels originally used were the branches, roots, and stumps of trees, charcoal, and dried dungcakes, but prior to the year 1500 B.C. the Ancients had no means of quickening their fires except by the use of a blow pipe.

About 1500 B.C. goat-skin bellows were introduced, and it is interesting to note that the natives of Africa and India still use bellows of this type.

It is exceedingly difficult to delve into the mists of antiquity and find information about the furnaces then in use. Progress during the dark ages of the Christian Era is equally difficult to trace, and a mist of obscurity falls upon the period between the illumined Classical Age and the Renaissance. It is in fact believed that 40 foolscap pages would cover all recorded information upon metallurgical progress from the earliest days of civilization to the dawn of the 15th Century.

In the early part of the 16th Century, Georgius Agricola began to write De Re Metallica, and in his completed work, which consisted of twelve volumes, he described metallurgical furnaces of the period, and gave complete information

* Summary of a paper before the Midland Junior Gas Association, Birmingham, Feb. 2, 1933.

about their operation. The furnaces were used for the smelting of iron ore, the forging of iron bars, the manufacture of glass, and the refining of silver.

In 1540 a similar book on metallurgical processes was written by Biringoccio, and published in Venice, which gives the first description of a reverberatory furnace, and thus marks an epoch in industrial furnace design. Prior to this time materials were heated by direct contact with the fire; consequently the introduction of furnaces with a separate fire box and heating chamber was an important development.

With the development of the iron industry in this country, it is recorded that the ironmasters had difficulty in procuring the timber required for the manufacture of the charcoal which was wanted for melting purposes. This was largely due to Queen Elizabeth, who objected to the depredation of the ironmasters in the woods and forests surrounding their works, and forebade the felling of the timber to make coals for the burning of the iron. As a result, the ironmasters began to experiment with the use of pit coal. The early experiments were unsuccessful, but in 1619 Dudley successfully demonstrated the use of the new fuel. It was not, however, until 1735 that pit coal began to be generally used. It was first commercially employed by Abraham Derby, of Coalbrook Dale.

From that time the iron industry rapidly developed, and efforts were made to improve the efficiency of the furnaces employed for both smelting and reheating purposes. In 1829 Neilson applied hot blast to blast furnaces, and his experiments were so successful that the fuel consumption per ton of iron was reduced from 8 tons 1¼ cwt. with cold blast, to 2 tons 13¼ cwt. with hot blast.

The successful use of preheated air in connection with blast furnaces therefore caused its use to be considered in connection with heating furnaces, and by 1845 Gustav Ekman, the Swedish Ironmaster, had installed a recuperative heating furnace. The Rev. Robert Stirling, of the Church of Scotland, is probably the first person to suggest the use of recuperators, and he described an equipment of this type in his Patent of 1817.

It should, however, be mentioned that Robert Gardiner, of London, suggested the use of waste-heat boilers in 1788.

Early in the 19th Century, engineers began to realize the potentialities of gaseous fuels, and it is recorded that Aubertot was using blast furnace gas for the burning of lime in 1809, and by 1814 he was advocating its use in metallurgical furnaces. The development of the gas producers therefore began about this time, and the equipments of Bischof, Ebelman, Ekman, and Beaufumé appeared before 1856.

The parent of all modern gas producers had not, however, appeared until 1861. This equipment was designed by Charles William and Frederick Siemens. These two men also developed the regenerative furnace which was regarded by Dr. Percy, the eminent Metallurgist of the 19th Century, as the most organized result in the process of furnace evolution.

After this date, that is, between 1865 and 1875, the famous furnaces of Boetius, Bicheroux, Gorman, Ponsard, and Swindell appeared. These were mostly of the gas-fired recuperative type, and they found great favour.

Between 1875 and 1900 the furnaces of Gjers, Biedermann and Harvey, Hollis, Pietzka, and Morgan appeared. These were also of most interesting construction. The present century therfeore arrived with the basic principles of furnace design fairly well developed, but little understood.

Furnace progress had, of course, been influenced by other factors. It is recorded that between 1816 and 1822 four distinct types of mechanical stoker were developed.

The use of pulverized coal was also considered as far back as 1831, and oil was discovered in America in 1859. Natural gas was also discovered in that country in 1875, and by 1885 was being employed on a tremendous scale in the Pittsburg district alone. Then come the development and use of coal gas, first as an illuminant in 1792, and several years later as a fuel in connection with engines and furnaces. Bye-product fuels, such as coke oven gas and blast furnace gas, were increasingly employed, and the application and use of the new fuels considerably influenced furnace progress.

From the beginning of the present century to the end of the European War, industrial furnaces were developed and installed on an empirical basis, and they were similar to the equipments introduced by the pioneers of the 19th Century. Since the war, efforts have been made to place the design of furnaces on a scientific basis, and it is now possible to design a furnace of high thermal efficiency and adaptability for a specific process, to pre-determine the fuel consumption, and capacity, and to build the equipment with complete assurance of success.

The design of a successful furnace is not an easy matter, and specialized knowledge and experience is essential.

Remarkable developments have, however, taken place during the last few years, and this is largely due to the work of the physicists and mathematicians in connection with the properties of gases, the combustion of fuels and the laws of heat transfer, the activities of research workers in the development of new and improved refractory materials, the work of metallurgists in the production of heat-resisting metals, and the efforts of engineers in co-ordinating the work of the others and developing improved methods of utilizing and conserving fuels.

Discussion.

The CHAIRMAN said the lecturer had given them an ideal history lesson. He believed there was an immense amount of real value in tracing the history of any particular phase of industrial development from its beginning. Mr. Southern said towards the end of his paper that they were sometimes apt to be content with things as they were. That was often so, but they must not allow themselves to believe they had reached finality. In every branch of their Industry there were countless developments and discoveries to be made, and these the ardent searchers would come across.

Mr. H. R. HEMS (Birmingham) proposed a vote of thanks to the lecturer. The address was of the type which, he felt, Associations such as theirs could usefully bring into their proceedings a little more frequently. The work of the early experimenters on furnaces made them realize what a small part it was they could play in the development of any angle of engineering of which furnace development formed a part. It was not given to them to make revolutionary discoveries, but they could do something in regard to the refinement of the various furnaces which were available.

Mr. J. H. WAINWRIGHT (Halesowen), in seconding, said he was inclined to disagree that they sat back and remained satisfied. The mechanical methods which had been evolved in recent years had given increased efficiency and had resulted in a large amount of unemployment. In the coalfields, for instance, previously something like 12 tons of coal was required to smelt one ton of steel, but that was now cut down to 8 tons.

Mr. SOUTHERN, in reply to a question, said Dud Dudleys were perfectly successful, but they took out certain patent rights in which other people claimed a share. There was disagreement and such trouble that the Government of the day made it impossible for Dud Dudley to go on with his work. Subsequently, when all these people had passed away, the Derbys came along and started where Dudley left off, and were able to commercialize the process.

Lighting-Up of Vertical Retort Settings.

The following is the author's reply to the comments of Mr. H. Kerr, of the Woodall-Duckham Companies, on the paper by Mr. H. Smith, of Birmingham, on "The Lighting-Up of Vertical Retort Settings," read at a meeting of the Midland Junior Gas Association. The paper, the discussion, and Mr. Kerr's remarks were published in the "JOURNAL" for Jan. 25.

It is suggested that the method described is to be commended in the case of a repaired job, where the major portion of the new brickwork is in the producers, but that in the case of complete reconstruction where all the brickwork is "moist" it is desirable to commence drying out retort settings at the same time as the producers—*providing that sufficient warm air is allowed to circulate through the setting.*

Experience shows that normally, at the commencement of drying-out operations, the pull on the setting stack is *nil*, and also that products from the slow fires are heavily supersaturated for the first few days. The circulation of sufficient warm gases, capable of taking up more moisture, is therefore a physical impossibility until a pull has been developed at the stack, and in the early stages water vapour taken up in the producers cannot help but be thrown down in the cooler parts of the setting, thus greatly increasing the amount of drying to be done later.

With regard to working under slight pressure conditions, it is true that there is very little difference in actual inches water gauge between very slight pressure and very slight pull, yet in character they are the direct opposites. One is positive, and the other negative; the former ensures even distribution of the products and the elimination of infiltration of cold air. The latter condition creates a distinct tendency for the warm products to take the shortest possible course, resulting in poor distribution, and infiltration takes place to a marked degree.

"*Lighting-Up.*"—With regard to the actual lighting-up of the setting, two factors are of paramount importance—they are safety and speed. The need for the former is sufficiently obvious. The need for speed is equally desirable, but often does not receive the consideration it should. The increase in temperature from the time lighting-up operations commence until 24 hours later should be gradual, and is only possible if the operation is performed speedily and then the producers checked back immediately to give the small volume of producer gas necessary. By the method which I described the operation is complete in two hours, and within five hours everything is checked back and in a settled condition. If, as Mr. Kerr suggests, eight to ten hours are taken in passing through the semi-gaseous condition, it is fairly obvious, that, in a battery setting, the flues adjacent to the producers must progress beyond the desired limits before the more remote flues are finally lit up.

Mid-Southern Utility Company

ANNUAL MEETING

The Annual Meeting of the proprietors of the Mid Southern Utility Company was held at Farnborough on Thursday, Feb. 2, 1933—Mr. R. W. EDWARDS, J.P., C.C., presiding.

The SECRETARY (Mr. F. A. Ricketts) read the Notice convening the meeting, and after the minutes of the previous annual general meeting, held on Feb. 25, 1932, had been confirmed, the CHAIRMAN rose to move the adoption of the Directors' Report and Accounts for the year 1932.

The Report was as follows:

After allowing for dividends on consolidated preference stock, interest paid to Bank and on redeemable mortgage bonds and debenture stock, as well as for the statutory dividends paid for the half-year ended June 30, 1932, the Directors recommend the full statutory dividends of £6 1s.% per annum on the "A" stock; £4 11s.% per annum on the "B" stock; and £5% per annum on the "C" stock for the latter half of the year—all less income-tax.

Having regard to the current economic conditions the business of the Company has been quite satisfactory during the past year, and the outlook is good.

Mr. L. Maltby, F.C.A. (of Messrs. Deloitte, Plender, Griffiths, & Co.), retires by rotation, and is willing to serve again if re-elected.

Mr. T. A. BRADDOCK is the retiring Director, and, being eligible, offers himself for re-election.

R. W. EDWARDS,
Chairman.

Jan. 26, 1933.

CHAIRMAN'S ADDRESS.

Addressing the proprietors, the CHAIRMAN said:

The Report and Accounts have now been in your possession for some days, and, with your permission, I propose to follow the usual course and take them as read.

As anticipated in my address of a year ago, we have now obtained the permission of Parliament to abbreviate further the title of the Company, which was previously too cumbersome.

GAS.

For some years now the net sales of gas have shown continued increases, but for 1932, in consequence of the periods of somewhat mild weather, and probably also of the economies exercised by the general public, owing to reduced incomes, the sales for the past twelve months show the surprisingly small decrease of 0·4%.

Having regard to the circumstances just mentioned, these results may be considered satisfactory, and the proprietors will appreciate the variations in temperature over the past two years by reference to the following table of comparisons of monthly mean night temperatures:

	1931.	1932.
	°F.	°F.
January	33·8	39·1
February	33·9	31·9
March	33·2	30·8
April	39·5	38·6
May	45·5	43·8
June	50·8	47·5
July	52·1	53·5
August	51·9	55·0
September	44·9	49·0
October	40·3	42·2
November	41·2	39·2
December	36·5	37·9
Average	41·966	42·375

It will be noticed that January, July, August, September, October, and December all show higher average temperatures than do the corresponding months of 1931.

The following apparatus was added during the year:

Cookers	481
Fires	535
Water heaters	1754

The amount received from residuals represented 48·6% of the cost of coal, as compared with 50·9% for the previous year. This decrease was influenced largely by the lower price received for coke, and the fact that the manufacturing cost of sulphate of ammonia was greater than the market price.

The yield in liquid products (calculated on ammoniacal liquor of 8 oz. strength) was 45·8 gallons per ton of coal carbonized, as compared with 47·47 gallons for the previous year. The slight decrease is attributed to the intermittent working of the sulphate of ammonia plant, necessitated during its reconstruction, and the consequent accumulation of an abnormal quantity of ammoniacal liquor in our wells.

WATER.

This Department has again been satisfactory, and the various plant, reservoirs, and underground works have been well maintained.

The total rainfall was the lowest in recent years, registering only 26·51 in., as compared with 30·42 in. for 1931.

The average net domestic consumption per head per day was 14·16 gallons.

ELECTRICITY.

This Department is developing satisfactorily, but owing to the various expansions taking place in added areas it is still somewhat difficult to give comparative details. As I indicated last year, however, we hope to resume that practice in a year or two.

The total advance in sales, as compared with the Report of 1932 (excluding consumptions on our various works) represents nearly 50 (49·5)%.

The following apparatus (including our subsidiary undertaking) have been fixed during the past year:

Lamps	21,677
Motors	57
Fires	804
Cooking apparatus	160
Sweepers	88
Irons	172
Miscellaneous	138

representing an additional load of 2960 KW., as compared with 2280 KW. for the previous year.

We had anticipated, more than three years ago, that with the introduction of the "grid" supplies it would be necessary to divorce our charges for non-domestic purposes, other than lighting, from those for domestic purposes, owing to the accentuated form in which the peak-load factor would then be introduced into our calculations, and last year's returns reflect the alteration which was applied in all our districts from Christmas, 1931.

It should be remembered that this Department must, for some years, be heavily burdened by the writing-off of the cost of generating stations and plant displaced by the "grid," and therefore the blessings of the national supply cannot be so soon or so fully enjoyed as the public may anticipate.

Considerable extensions have recently been completed, but the demand for further development is still fairly good, and a number of schemes are in hand. The charge of failing to exercise their powers cannot be laid against your Company, whose expansion during the past year compares very favourably with that of undertakers in other parts of England.

CAPITAL.

For the three undertakings, the amount of capital authorized is £1,776,367 14s. 2d. Of this there has been received £1,266,746 15s. 7d. Adding the debit balance of £18,191 6s. 5d. we arrive at the total of £1,284,938 2s., and after deducting the amount added on consolidation there is a net expenditure of £1,243,948 13s. 9d.

Over the past year, after deducting depreciation of £18,362 2s. 2d., the capital expended was £37,042 4s. 4d.

GENERAL.

During the year we added 3923 consumers in all departments—making a net increase of approaching 18,000 (17,911) in nine years. I quite anticipate that by the end of the present year the total number of consumers added for the ten years will approximate 21,000, which will represent, at an average of five persons per household, the population of a very substantial town.

I am pleased to report that our Co-Partnership Scheme continues to give great satisfaction. For the year ended June 30, 1932, the bonus was 7·7%, the same as for the previous year. The scheme has now been in operation for about 22 years.

The Sports Club and the Hospital and Benevolent Fund, in conjunction with the various Hospitals and Convalescent Homes, have done excellent work during the year, respectively for the recreation of the employees and the relief of those who have been ill or injured.

The Directors pay full tribute to the principal officers, and to all the various officials and employees under them, for the devotion and zeal which have been displayed in the execution of their duties.

Generally the outlook is good, and the next few years should very substantially increase and broaden the trading returns of the Company.

In conclusion, I now move the following resolution, which I will ask the Deputy-Chairman, Mr. T. A. Braddock, to second:

> "That the Directors' Report and Statement of Accounts for the twelve months ended Dec. 31, 1932, be and are hereby adopted, and that the dividends as therein recommended be and are hereby declared to be payable to the proprietors on March 1."

Carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. B. R. GREEN, Mr. T. A. Braddock was unanimously re-elected to the Board, and subsequently Mr. Lionel Maltby, F.C.A., was re-appointed an Auditor of the Company.

Supported by Major-General J. A. HARTIGAN, C.M.G., D.S.O., a cordial vote of thanks to the Chairman, Directors, and Staff was submitted by Mr. J. W. YOUNGS, and a response by the CHAIRMAN concluded the business.

NOTES ON PLANT AND PROCESSES

New High-Temperature Furnace.

We have received from Messrs. Bush, Beach, & Gent, Ltd., particulars of a most interesting series of high-temperature gas-fired furnaces. The " Degussa " furnace, as it is called, works on the surface combustion principle, but the air and gas (which is supplied at normal mains pressure) are not mixed prior to entering the furnace. The reason for this is to eliminate back-firing.

The furnace, for working at temperatures up to 2000° C., contains an internal lining of magnesia or zirconium oxide. All refractory parts have the form of segments, are dove-tailed, and provided with special knobs to ensure better support. Single segments keep longer, are cheaper to manufacture, and more convenient to replace than large undivided parts. The type of furnace at present produced has a vertical and cylindrical working-space and is constructed as follows:

The internal working-space is concentrically surrounded by a mantle. The comparatively narrow intervening space between these casings is the actual combustion chamber. To increase the surface accelerating the combustion by catalytic contact effect, tubes are put in this combustion chamber loosely and parallel to the gas current. The enlargement of the efficacious surface is thus attained without materially increasing the resistance in the furnace.

The gases (air and coal gas) leaving the burner, which is fixed in the centre, separately are not mixed until they enter the combustion chamber, where they are at once ignited. After passing the combustion chamber, the waste gases are conducted down into a free space between the mantle and the lining of the furnace in order to be conveyed out through a lower opening to the chimney. This style of " double flame conduction " ensures a more complete utilization of the heat contained in the combustion gases than is effected by " single flame conduction," by means of which the heat is conducted direct out of the combustion zone into the chimney.

The hot waste gases are utilized in a double-walled pipe to heat the fresh air on the counter-current principle.

Vertical Air Compressors.

An enlarged and greatly revised pamphlet has recently been published by Messrs. Reavell & Co., Ltd., of Ranelagh Works, Ipswich, describing their standard range of vertical single-acting, single-stage air compressors.

These machines have been designed to provide a series of machines of simple and robust construction suitable for pressures up to 100 lbs. per sq. in., and for capacities ranging from the smallest normally required up to the point where the increased efficiency obtainable justifies the use of the firm's vertical two-stage double-acting compressors.

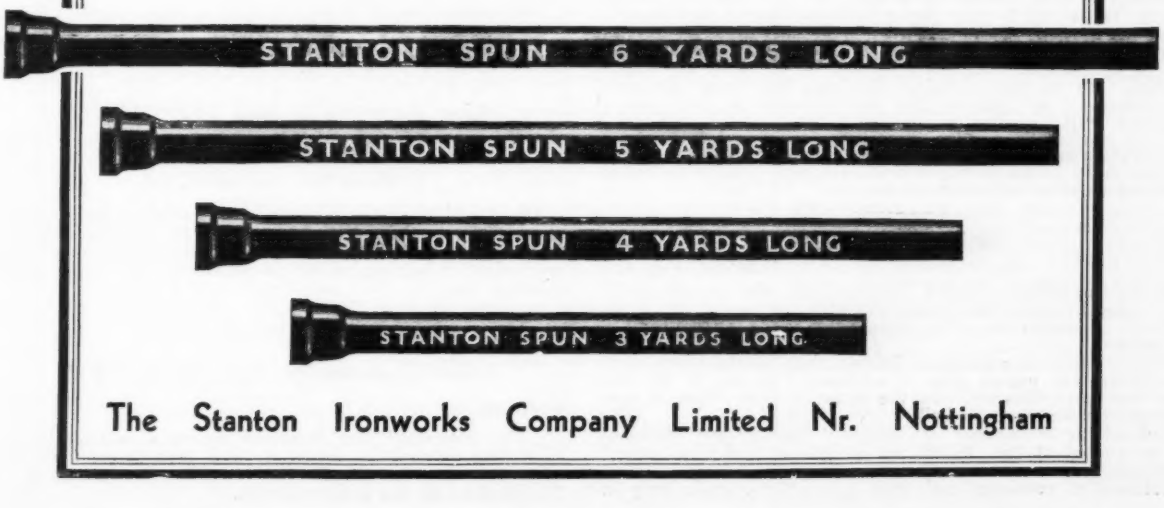
They can be operated satisfactorily over a wide range of pressure and speed, and are suitable for belt drive or for direct-coupling to engines or electric motors. Of the eleven standard sizes kept in stock, the five smallest are single-cylinder machines, the next five have two cylinders, and the largest has three cylinders. The two smallest are supplied as air-cooled machines only, and the remaining sizes are completely water-jacketed.

Each complete valve unit consists of one or more ring plates of stainless steel which are pressed on to their seats by a number of small springs housed in pockets in the valve guard, the assembly being held together by a central bolt. This arrangement allows of light and equal valve loading, the valve ring plates seating perfectly and independently of one another. All the valves are readily accessible, and the removal of any one for inspection or replacement can be effected without disturbing any other part of the machine, and is the work of only a few minutes.

The compressor body is of close-grained cast iron, and the crank-chamber is provided with large doors giving ready access to the working parts. The crankshaft and connecting rods are steel drop-forgings. The crankshaft bearings are provided with removable die-cast white metal bushes, except in the case of the three smallest machines, where the crankshaft runs in ball bearings.

The connecting rod big-ends are also provided with easily renewable and readily adjustable die-cast white metal bearings, and the connecting rod small-ends are fitted with phosphor-bronze bushes working on steel gudgeon pins.

STANTON
DELAVAUD
Spun Iron Pipes
3, 4, 5 and 6 Yards Long



The Stanton Ironworks Company Limited Nr. Nottingham

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The outstanding events on the Stock Exchange last week were the feverish activity in the South African gold mining share market, and the heavy buying of gilt-edged securities. The rises in price of the former have been spectaular, and the "boom" is attributable to the additional profits which it is anticipated will accrue to the mines as a result of South Africa going off the Gold Standard. The support of gilt-edged stocks continues by reason of the belief that the present cheap monetary conditions will remain for some time to come.

A large number of transactions were recorded in Gas stocks and shares, and it will be seen in the List that many prices improved, in some cases substantially. Four out of the six Gas Light stocks were marked up, the £1 units by 9d. to 26s., which is doubtless due to the excellent results shown by the accounts recently published. Alliance and Dublin recovered 3 points to 113, and Hastings and St. Leonards 3½% rose 5 points to 109½.

Among the latest ordinary dividend announcements for the past half year are: South Metropolitan, 3½%, making 6% for the year; Newcastle-on-Tyne, 2⅞%, a total of 5⅝% for the year; and Croydon, 3½% on the sliding-scale stock, making 7% for the year. All these rates are maintained the same as those paid for the year 1931—a fact which cannot be too strongly emphasized having regard to the depression of last year. The East Surrey Gas Company is increasing its distribution on the "B" ordinary stock to 3% (against 2⅞% for the second half of 1931), making 6% for the year, as compared with 5¾%.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Feb.* 6.

There is little change to report in the prices of tar products, which are as follows:

Pitch is steady at about 100s. per ton f.o.b.

Creosote is 3½d. to 5d. per gallon f.o.b., according to specification.

Refined tar is about 4¼d. to 4½d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 5d.; pure benzole, about 1s. 11d. to 2s.; solvent naphtha, 95/160, about 1s. 8d.; and 90/140 pyridine bases, about 3s. 9d. per gallon naked at makers' works.

Tar Products in the Provinces.

Feb. 6.

The average prices of gas-works products during the week were: Gas-works tar, 34s. to 39s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal-tar crude naphtha, in bulk, North, 6d. to 6¼d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¼d. to 2⅜d.; low gravity, 1¼d.; Scotland, 2¼d. to 2⅜d. Heavy oils, in bulk, North, 4⅜d. to 5½d. Carbolic acid, 60's, 2s. 2d. to 2s. 3d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Feb.* 4.

While throughput remains disappointing, there is practically no change in quotations during the week.

Crude gas-works tar.—The actual value is 45s. to 50s. per ton *ex* works.

Pitch.—There is not much activity, but, stocks being comparatively low, export price is unchanged at 85s. to 87s. 6d. per ton f.o.b. Glasgow. In the home market value is now 90s. per ton *ex* works in bulk.

Refined tar to Ministry of Transport Specification continues to be quoted at 3¾d. to 4d. per gallon *ex* works in buyers' packages.

Creosote oil continues dull, with values of all grades easy in tone. B.E.S.A. Specification is 2¾d. to 3¼d. per gallon; low gravity, 2½d. to 3d. per gallon; and neutral oil, 2¾d. to 3¼d. per gallon—all *ex* works in bulk.

Cresylic acid.—Orders are few and far between. Pale, 97/99%, is 10¾d. to 11½d. per gallon; dark, 97/99%, 9¾d. to 10½d. per gallon; and pale, 99/100%, 1s. 1½d. to 1s. 2½d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Value to-day is steady at 4½d. to 5d. per gallon *ex* works, according to quantity and quality.

Solvent naphtha.—90/160 grade is offered at 1s. 2d. to 1s. 3d. per gallon, while 90/190 heavy is nominal at 11d. to 1s. per gallon.

Motor benzole.—Production is quite low, and price is round 1s. 4d. to 1s. 5d. per gallon *ex* works in bulk.

Pyridines.—90/160 grade is 2s. 9d. to 3s. per gallon, and 90/140 grade 3s. to 3s. 3d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 10½	to	0 11	per gallon at works
Motor ,,	1 6¾	,,	1 7	,, ,, ,,
Pure ,,	1 10	,,	1 11	,, ,, ,,

Contracts Advertised To-Day.

Benzole Recovery Plant, &c.

The Leeds Corporation Gas Committee invite tenders for the supply and erection of plant for benzole recovery and naphthalene removal. [Advert. on p. 326.]

Coal.

The Plymouth Corporation invite tenders for the supply of various coals. [Advert. on p. 326.]

Dismantling, &c.

The Edinburgh Corporation Gas Department invite tenders for alterations to gasholder and the dismantling of others. [Advert. on p. 326.]

Gasholder.

The Sidmouth Gas Department invite tenders for a spiral-guided gasholder. [Advert. on p. 326.]

Mantles.

The Plymouth Corporation invite tenders for the supply of mantles. [Advert. on p. 326.]

Oils.

The Borough of Stockton-on-Tees invite tenders for the supply of various oils. [Advert. on p. 326.]

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Devon Gas Association, Ltd.

The Association are applying for a Special Order authorizing the transfer to them of the gas undertaking of the Urban District Council of Ashburton, to increase the maximum price now authorized to be charged for gas within the said Urban District Council, and for other purposes.

Gas Companies' Results in 1932.

Fleetwood.

The Fleetwood Gas Company report a half-yearly profit of £2314, reduced by debenture and loan interest to £1606. They recommend a 6% dividend on the preference stock, and 7% dividend on the ordinary stock.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.-Yr.	Dividends. Last Hf.-Yr.	NAME.	Quotations. Feb. 4. (Provincial Exchanges Feb. 3.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 3	7⅞	7⅞	Alliance & Dublin Ord. ...	108–118	+3	113⅜–117
374,000	„	Jan. 9	4	4	Do. 4 p.c. Deb. ...	80–90	...	...
557,655	„	Aug. 22	7	7	Barnet Ord. 7 p.c.	147–152	+2	150½–151
300,000	1	Oct. 17	1/9⅔	1/4⅓	Bombay, Ltd.	23/–25/-	...	24/3–25/-
177,750	Stk.	Aug. 22	9	9½	Bournemouth sliding scale	195–205	...	...
550,050	„	„	7	7	Do. 7 p.c. max. ...	150–160	...	...
449,160	„	„	6	6	Do. 6 p.c. Pref. ...	138–143	...	...
50,000	„	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75–80	...	...
162,025	„	„	4	4	Do. 4 p.c. Deb. ...	98–103	...	...
210,000	„	„	5	5	Do. 5 p.c. Deb. ...	120–125	...	...
357,900	„	Aug. 22	7½	7½	Brighton, &c. 6 p.c. Con. ...	143–148	...	...
540,000	„	„	6⅔	6⅔	Do. 5 p.c. Con. ...	131–136	...	...
195,500	„	„	6	6	Do. 6 p.c. B Pref.	135–145	...	139
1,287,500	„	Aug. 8	5	5	Bristol 5 p.c. max.	111–112*a*	+½	...
12[illegible],420	„	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	96–98*a*	...	...
217,870	„	„	4	4	Do. 2nd 4 p.c. Deb. ...	95–97*a*	...	...
328,790	„	„	5	5	Do. 5 p.c. Deb.	120–124*a*	...	...
855,000	„	Oct. 3	6	7	British Ord.	142–147	...	145½–146½
100,000	„	Dec. 19	7	7	Do. 7 p.c. Pref.	140–150	...	144
350,000	„	„	—	5½	Do. 5½ p.c. Pref. ...	105–110	...	...
120,000	„	„	4	4	Do. 4 p.c. Red. Deb. ...	90–95	...	...
450,000	„	„	5	5	Do. 5 p.c. Red. Deb. ...	105–115	...	...
160,000	„	Jan. 9	5	5	Cambridge 5 p.c. Deb. ...	117–122	...	...
100,000	10	Dec. 5	6	6	Cape Town, Ltd.	7½–8½	...	...
100,000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref. ...	6–7	...	...
100,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	88–93	...	...
626,860	„	Aug. 8	6	6	Cardiff Con. Ord.	110–115	...	114½
237,860	„	Jan. 9	2½	5	Do. 5 p.c. Red. Deb.	105–110	...	108
157,150	„	Aug. 8	5½	5	Chester 5 p.c. Ord.	93–98*b*	...	...
98,936	1	Oct. 17	2/-	2/-	Colombo, Ltd. Ord.... ...	25/–30/-	...	...
24,500	1	Oct. 17	1/4⅓	1/4⅓	Do. 7 p.c. Pref. ...	19/–21/-	...	...
609,204	1	Oct. 17	/10'90	/11'47	Colonial Gas Assn. Ltd. Ord.	16/–18/-	...	...
296,053	1	„	1/2 54	1/3 30	Do. 8 p.c. Pref.	19 6–21/6	...	...
1,796,955	Stk.	Aug. 8	5⅔	5	Commercial Ord.	113 118	...	...
475,000	„	Dec. 19	3	3	Do. 8 p.c. Deb. ...	73 78	...	75½
265,272	„	—	—	—	Do. 5 p.c. Deb. ...	117–122	...	...
807,560	„	Aug. 8	7	7	Croydon sliding scale	140 145	...	144–145
469,590	„	„	5	5	Do. max. div. ...	95–103	+1½	...
500,000	„	Jan. 9	5	5	Do. 5 p.c. Deb. ...	117–122	...	121
542,270	„	Aug. 8	10	7	Derby Con.	50–160*c*	...	...
55,000	„	Jan. 9	4	4	Do. 4 p.c. Deb. ...	80–85*c*	...	...
209,000	„	Sept. 5	5	5	East Hull Ord. 8 p.c. ...	97–102	...	...
179,500	„	Aug. 22	5⅔	6	East Surrey Ord. 6 p.c.	116–121	...	...
155,019	„	Dec. 19	5	5	Do. 5 p.c. Deb. ...	115–120	...	...
1,002,180	„	Sept. 19	†6½	15	European, Ltd.	130–135	+3	133–135
11,373,992	„	Aug. 8	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	25/6–26/6*f*	+·/9	25/–26/1½
2,600,000	„	„	3½	3½	Do. 3½ p.c. max. ...	82–87	+1	84–85
4,477,106	„	„	4	4	Do. 4 p.c. Con. Pref. ...	100–103	+1	100½–103
6,102,497	„	Dec. 19	3	3	Do. 3 p.c. Con. Deb. ...	76 80	+1	76½–78½
3,642,770	„	„	5	5	Do. 5 p.c. Red. Deb. ...	113–116	...	114–115½
3,500,000	„	„	4½	4½	Do. 4½ p.c. Red. Deb. ...	109–112	...	110½–111½
264,011	„	Aug. 22	—	6	Harrogate New Cons. ...	110–115	...	...
82,500	„	Aug. 22	7	7	Hastings & St. L. 5 p.c. Conv.	130–140	...	...
258,740	„	„	5½	5½	Do. 3½ p.c. Conv.	107–112	+5	111–112
70,000	10	Oct. 17	†10	†10	Hongkong & China, Ltd. ...	9½–10⅝	...	...
213,200	Stk.	Aug. 22	6	6	Hornsey Con. 3½ p.c. ...	117–125	...	...
5,600,000	„	Nov. 21	14	10	Imperial Continental Gas	207–217	+2	212½–215
223,130	„	Aug. 8	8½	8½	Do. 8½ p.c. Red. Deb.	90–95	...	92½
235,242	„	Aug. 8	8⅔	8⅔	Lea Bridge 6 p.c. Ord. ...	165–165	...	...
2,145,907	„	Aug. 22	6	6	Liverpool 5 p.c. Ord. ...	122–124*b*	...	...
245,500	„	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100–114*b*	...	...
306,083	„	Jan. 19	4	4	Do. 4 p.c. Deb. ...	99–107*b*	...	...
165,736	„	Sept. 5	10	8	Maidstone 5 p.c. Cap. ...	160–170	...	...
56,176	„	Dec. 19	3	3	Do. 3 p.c. Deb. ...	68–73	...	...
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean ...	7¼–8¼	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98–103	...	...
171,978	Stk.	Sept. 5	5	5	M. S. Utility "C." Cons. ...	100–105	...	93½–94
718,657	„	„	4	4	Do. 4 p.c. Cons. Pref.	90–95	...	...
112,126	„	Jan. 9	4	4	Do. 4 p.c. Deb. ...	95–100	...	...
148,955	„	„	5	5	Do. 5 p.c. Deb. ...	115–120	...	...
675,000	„	21 May '31	16	16	Montevideo, Ltd.	35–45	...	41¼–41¾
2,661,315	„	Aug. 8	5⅔	5	Newcastle & Gateshead Con.	23/3–24/3*d*	+·/3	...
682,856	„	„	4	4	Do. 4 p.c. Pref. ...	95–97*d*	...	...
691,705	„	Jan. 9	3½	3½	Do. 3½ p.c. Deb. ...	89–91*d*	...	...
277,285	„	Nov. 7	5	5	Do. 5 p.c. Deb. '43...	103–107*d*	...	...
274,000	„	Aug. 8	5	5	Newport (Mon.) 5 p.c. max.	95–98*a*	...	...
199,940	„	Aug. 22	7½	7½	North Middlesex 6 p.c. Con.	135–145	...	...
396,160	„	Aug. 8	5	5	Northampton 5 p.c. max. ...	100–105	...	...
300,000	„	Dec. 5	7	9	Oriental, Ltd.	112–117	...	...
205,162	„	Dec. 19	8	8	Plym'th & Stonehouse 5 p.c.	140–150	...	147
504,416	„	Aug. 22	8	8	Portsm'th Con. Stk. 4 p.c. Std.	150–160	...	...
241,446	„	„	5	5	Do. 5 p.c. max. ...	97–102	...	...
114,000	„	Aug. 8	5	5	Preston 5 p.c. Pref. ...	105–110	...	...
686,312	„	Jan. 23	4	4	Primitiva 4 p.c. Rd. Db. 1911	82–87*	...	...
389,813	„	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	82–87	...	...
150,000	10	Sept. 19	6	6	San Paulo 6 p.c. Pref. ...	6¾–7¼	...	...
1,736,968	Stk.	Sept. 5	6	6	Sheffield Cons.	114–116*e*	...	...
95,000	„	Jan. 9	4	4	Do. 4 p.c. Deb.	91–95*e*	...	...
133,201	„	Sept. 5	8	8½	Shrewsbury 5 p.c. Ord. ...	118–123	...	...
90,000	10	June 6	15	15	South African	4–6	...	...
6,709,895	Stk.	Aug. 8	7	5	South Met. Ord.	123–128	...	125–127½
1,135,812	„	„	6	6	Do. 6 p.c. Irred. 'A'.	138–143	...	141–141½
1,895,445	„	Jan. 9	3	3	Do. 3 p.c. Deb. ...	77–80	...	77½
1 000,000	„	Jan. 23	5	5	Do. 5 p.c. Red. Deb.	108–113*	...	113
209,820	„	Aug. 8	8½	8½	South Shields Con.	150–155*d*	...	...
1,543,795	„	Aug. 8	6	6	South Suburban Ord. 5 p.c.	122–127	+1	124–125
300,000	„	„	5	5	Do. 5 p.c. Pref.	112–117	...	114½–116½
868,837	„	Dec. 19	5	5	Do. 5 p.c. Deb.	120–125	...	122–124
647,740	„	Aug. 22	5	5	Southampt'n Ord. 5 p.c. max.	105–110	+3	109
121,275	„	Dec. 19	4	4	Do. 4 p.c. Deb.	95–100	...	...
350,000	„	Aug. 8	—	9/-	Swansea 5½ p.c. Red. Pref.	110 114	...	...
200,000	„	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	103–108	...	...
1,076,490	„	Aug. 8	6⅔	6⅔	Tottenham and District Ord.	132–137	+1	134
300,000	„	„	5½	5½	Do. 5½ p.c. Pref. ...	120–125	...	...
199,005	„	Dec. 19	4	4	Do. 4 p.c. Deb. ...	96–101	+1	100–100⅔
85,701	„	Sept. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	67–72	...	...
346,069	„	Aug. 22	7	7	Uxbridge, &c., 5 p.c. ...	133–143	...	143–144
88,330	„	„	5	5	Do. 5 p.c. Pref. ...	110–115	...	...
1,322,220	„	July 4	7	7	Wandsworth Consolidated	140–145	...	...
1,096,373	„	„	5	5	Do. 5 p.c. Pref.	114–119	...	115½–116
1,317,964	„	Dec. 19	5	5	Do. 5 p.c. Deb.	118–123	...	121–122½
158,400	„	Aug. 22	6g	5	Winchester W. & G. 5p.c. Con.	107–112	...	...

Quotations at :—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

COMPANY NOTICES.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company relating to ORDINARY STOCK only WILL BE CLOSED on the 15th of February, 1933, and RE-OPENED on the 1st of March, 1933.

By order of the Board,
E. D. DAVEY,
Secretary.

Offices:
139, Cannon Street,
London, E.C. 4.
Feb. 1, 1933.

UXBRIDGE, MAIDENHEAD, WYCOMBE, AND DISTRICT GAS COMPANY

NOTICE is Hereby Given that the 72ND ORDINARY GENERAL MEETING of the Company will be held at 159-162, Palace Chambers, Bridge Street, Westminster, S.W. 1, on Friday, the 24th day of February, 1933, at 2.30 p.m.

To receive the Directors' Report and the Accounts of the Company for the Year ended the 31st of December, 1932.
To Declare a Dividend for the year.
To Elect a Director.
To Elect an Auditor and fix the Auditors' remuneration.
To Transact the General Business of the Company.

The STOCK TRANSFER BOOKS of this Company WILL BE CLOSED from the 14th to the 28th day of February, 1933, both inclusive.

By order of the Board,
GEORGE J. BRISTOW,
Secretary.
Uxbridge,
Jan. 26, 1933.

BRIGHTON, HOVE, AND WORTHING GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given that the ANNUAL GENERAL MEETING of the Company will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, in the City of London, on Friday, the 3rd day of March, 1933, at 2.30 o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the Year ended the 31st of December, 1932; to declare Dividends; to elect two Directors; to elect an Auditor; to appoint a Special Auditor; and for Other Purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 18th of February to the 3rd of March, 1933, both days inclusive.

By order,
HYDE C. BURTON,
Secretary.
Secretary's Office:
5, Great Winchester Street,
Old Broad Street, London, E.C. 2,
Feb. 7, 1933.

NORTH MIDDLESEX GAS COMPANY.

NOTICE OF GENERAL MEETING.

NOTICE is Hereby Given that the ANNUAL GENERAL MEETING of the Company will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, in the City of London, on Monday, the 6th day of March, 1933, at 2.45 o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the Year ended the 31st of December, 1932; to declare Dividends; to elect a Director; to elect an Auditor; and for Other Purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 21st of February to the 6th of March, 1933, both days inclusive.

By order,
HYDE C. BURTON,
Secretary.
Secretary's Office:
5, Great Winchester Street,
Old Broad Street, London, E.C. 2,
Feb. 7, 1933.

SOUTHGATE AND DISTRICT GAS COMPANY.

NOTICE OF GENERAL MEETING.

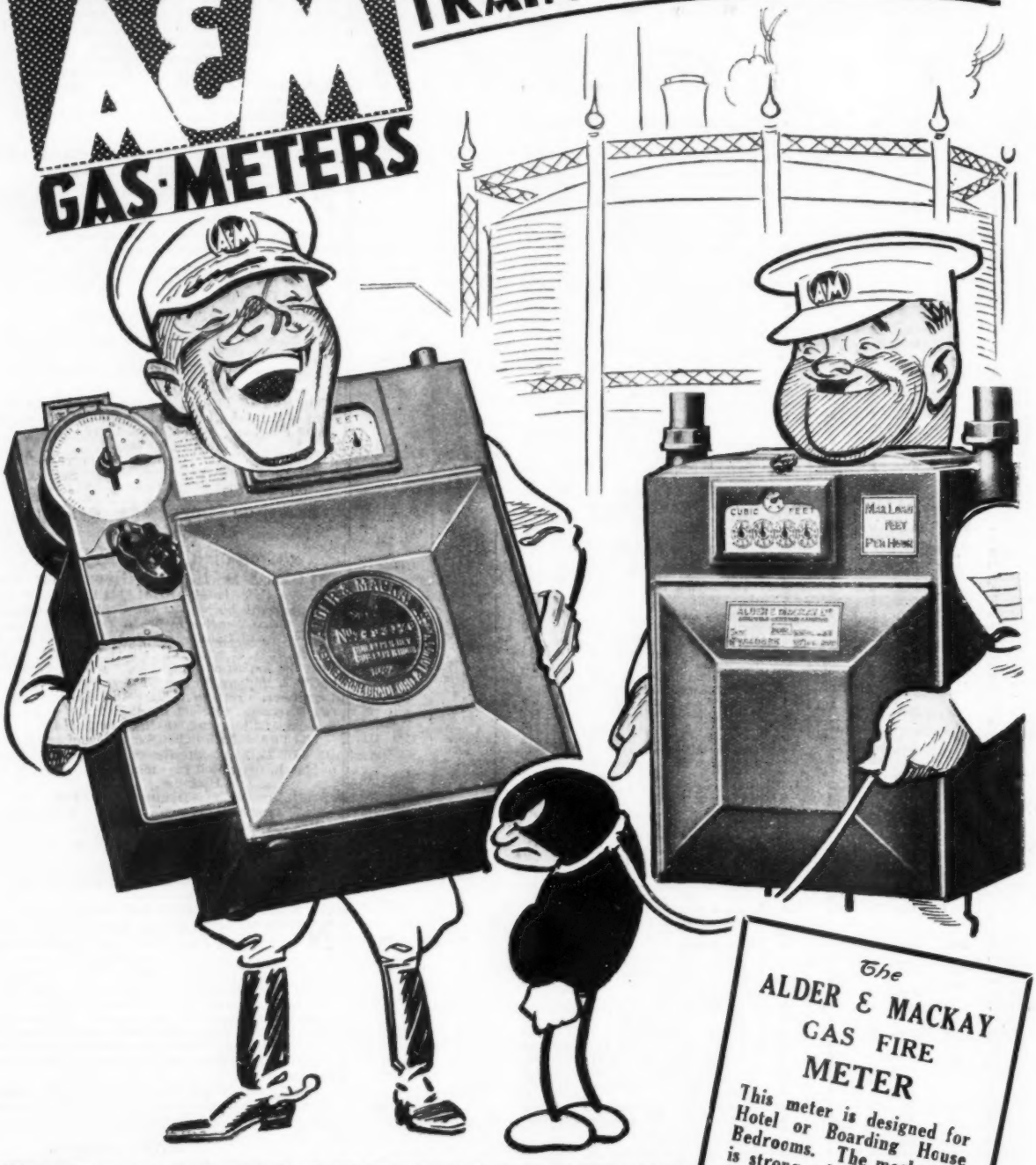
NOTICE is Hereby Given that the ANNUAL GENERAL MEETING of the Company will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, in the City of London, on Thursday, the 2nd day of March, 1933, at Three o'clock p.m. precisely, to receive the Report of the Directors and the Accounts of the Company for the Year ended the 31st of December, 1932; to declare Dividends; to elect two Directors; to elect an Auditor; and for Other Purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 17th of February to the 2nd of March, 1933, both days inclusive.

By order,
HYDE C. BURTON,
Secretary.
Secretary's Office:
5, Great Winchester Street,
Old Broad Street, London, E.C. 2,
Feb. 7, 1933.

A&M GAS·METERS

TRAIN·THE·THERMS



THE·PARADE·OF·THE·THERMS

Poor little therm – up before the C.O. Sergt. A. & M. Meters has charged him with attempting to escape. The C.O. enjoys the joke, for he knows there is no escaping from the Sergt.; he knows also that every therm's activities in producing light, heat or power are accurately recorded by the Sergt. You *must have* A. & M. Meters to look after your therms.

ALDER & MACKAY LIMITED

MAKE METERS OF METICULOUS MEASUREMENT

The ALDER & MACKAY GAS FIRE METER

This meter is designed for Hotel or Boarding House Bedrooms. The mechanism is strong, reliable and silent in action. The meter is unobtrusive and can be provided with a small wood cabinet stained mahogany finish. The meter is fitted with an adjustable price range plate whereby the Hotel proprietor can set it to pass such a quantity of gas for each coin as he deems expedient. Write for illustrated leaflet.

ALDER & MACKAY LTD., EDINBURGH, LONDON & BRANCHES.

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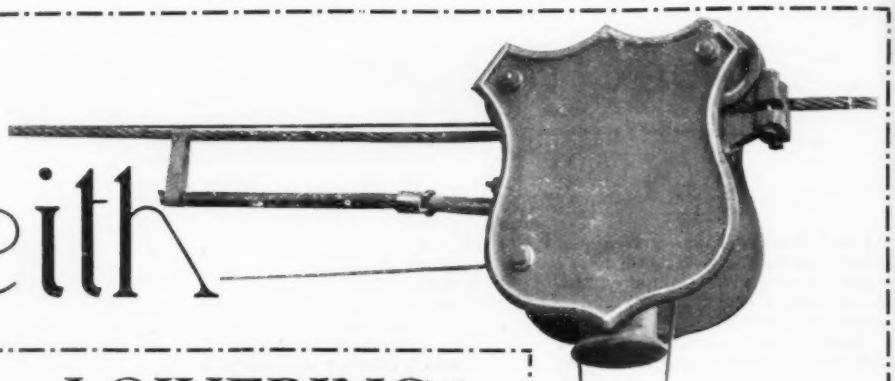

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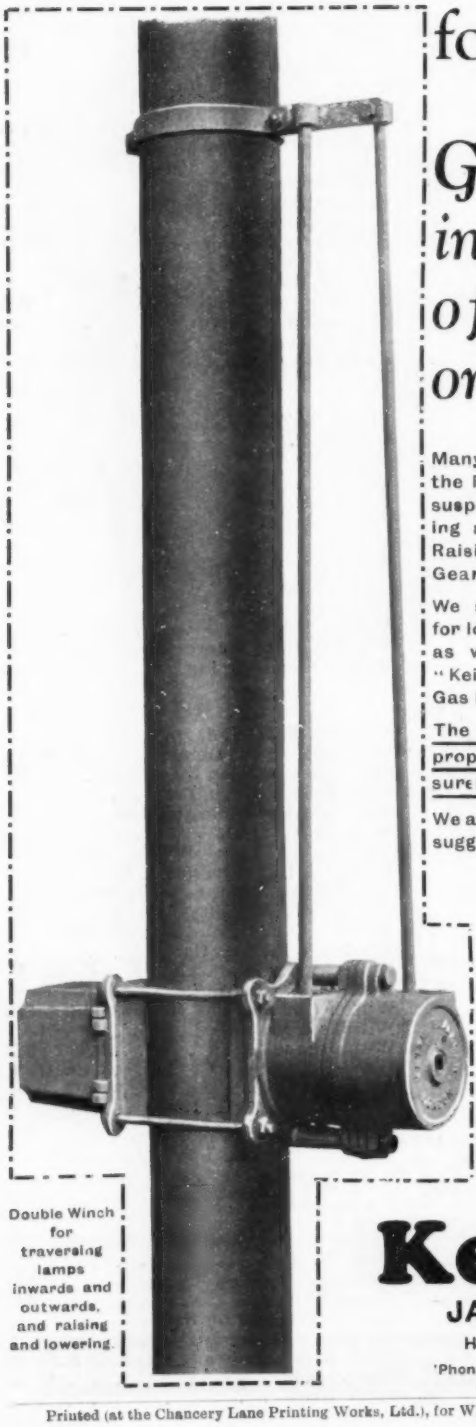

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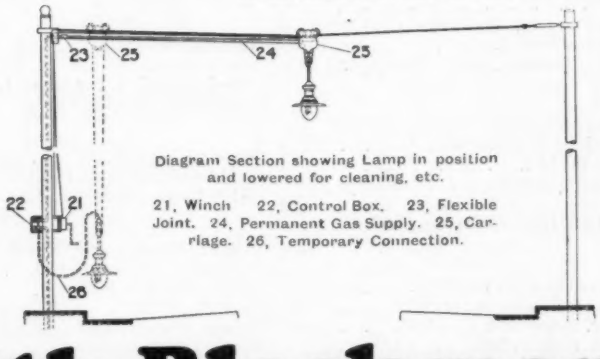

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